Vol. 1122 Number 4

OFFICIAL GAZETTE

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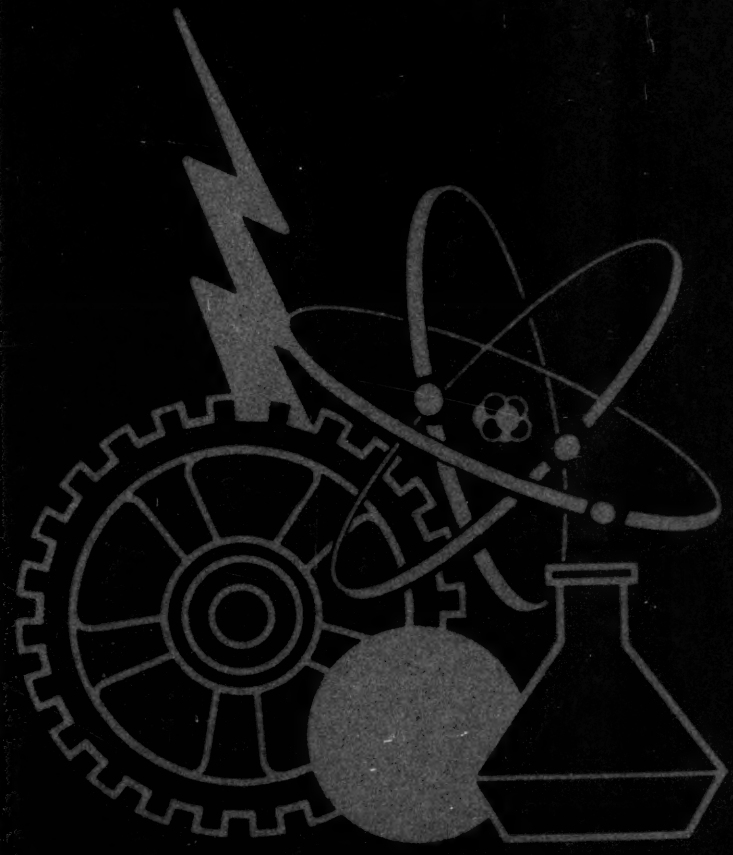
PATENTS

January 22, 1991



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OFFICIAL GAZETTE of the
UNITED STATES PATENT AND TRADEMARK OFFICE

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THE OFFICIAL GAZETTE (PATENT SECTION), issued weekly.
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GENERAL INFORMATION concerning TRADEMARKS.

COPIES OF PATENTS are furnished by the Patent and Trademark Office at $1.50 each; PLANT PATENTS in color, $10.00 each; copies of TRADEMARKS at $1.50 each. Address orders to the Commissioner of Patents and Trademarks, Washington, D.C., 20231.

Printing authorized by Section 11(a)3 of Title 35, U.S. P.T.O.

[26] In the case of a suggestion for rehearing en banc, we obtain approval from the Solicitor General.

ERRATA

Jan. 15, 1991 folios stop on page 1765.

Jan. 22, 1991 folios begin on page 1833.

Patent Cooperation Treaty (PCT) Information

For information concerning the PCT member countries see the notice appearing in the *Official Gazette* at 1120 O.G. 14 on Nov. 27, 1990.

For use of the European Patent Office as an International Searching Authority for international applications filed in the United States Receiving Office, see the notice appearing in the *Official Gazette* at 1022 O.G. 52 on Sept. 28, 1982.

For use of the European Patent Office as an International Preliminary Examining Authority for international applications filed in the United States Receiving Office, see the notices appearing in the *Official Gazette* at 1080 O.G. 2 on July 7, 1987 and at 1091 O.G. 2 on June 7, 1988. There is no longer a limit on the number of such international applications accepted for international preliminary examination by the European Patent Office; see the notice appearing at 1116 O.G. 32, on July 17, 1990.

The search fee of the European Patent Office was changed due to a difference in the amount of the fee in German Marks and the exchange rate of the U.S. dollar in relation to the German Mark as of Jan. 3, 1991, and was announced in the *Official Gazette* at 1122 O.G. 566 on Jan 1, 1991.

International fees were changed on September 1, 1990 due to a difference in the exchange rate of the U.S. dollar in relaton to the Swiss Franc and were announced in the *Official Gazette* at 1116 O.G. 32 on July 17, 1990.

Certain domestic PCT fees and charges for International Search and Preliminary Examination have been changed effective Apr. 17, 1989 and were announced in the *Official Gazette* at 1100 O.G. 24 on Mar. 7, 1989.

The current schedule of PCT fees (in U.S. dollars) is as follows:

Transmittal fee:	170.00
Search Fee	
U.S. Patent and Trademark Office (USPTO) as International Searching Authority (ISA)	
—No corresponding prior U.S. national application filed	550.00
—Corresponding prior U.S. national application filed	380.00
—Supplemental search fee, per additional invention	150.00
European Patent Office as ISA	1492.00
Preliminary examination fee	
USPTO as International Preliminary Examining Authority (IPEA)	
—Search fee paid to USPTO as ISA.	400.00
—Additional examination fee, per additional invention	130.00
—ISA not the USPTO	600.00
—Additional examination fee, per additional invention	200.00
International fees	
Basic fee	502.00
Basic Supplemental fee (for each page over 30)	10.00
Designation fee per country or region for the first 10 national or regional offices	122.00
Designation fee for 11th and subsequent designations	No Charge
Handling fee	154.00

U.S. National Stage fees

	Small Entity	Regular
USPTO was IPEA	165.00	330.00
USPTO was ISA but not IPEA	185.00	370.00
USPTO was neither ISA nor IPEA	250.00	500.00
USPTO was IPEA and all claims presented satisfied provisions of PCT Article 33(2) to (4)	25.00	50.00
—For each independent claim in excess of 3	18.00	36.00
—For each claim in excess of 20	6.00	12.00
—For each application containing a multiple dependent claim	60.00	120.00
—Surcharge for filing national fee or oath or declaration after the time limit applicable under PCT Article 22 or 39(1)	60.00	120.00
—Processing fee for filing English translation after the time limit applicable under PCT Article 22 or 39(1)	30.00	30.00

Dec. 6, 1990

HARRY F. MANBECK, Jr.
Assistant Secretary and Commissioner of Patents and Trademarks.

Patent Cooperation Treaty Update

The International Bureau of the World Intellectual Property Organization has informed the U.S. Patent and Trademark Office that, due to changes in the exchange rate of U.S. dollar with regard to the Swiss Franc, the dollar amount of the international fees for international applications filed in the United States Receiving Office will increase, effectice March 1, 1990.

Basic Fee(first 30 pages)	$559.00
Basic Supplemental fee (for each page over 30)	$11.00
Designation fee (per country or region up to 10)	$135.00
Handling fee	$171.00

Dec. 21, 1990

HARRY F. MANBECK, Jr.
Assistant Secretary and Commissioner of Patents and Trademarks

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Notice of Maintenance Fees Payable

Title 37, Code of Federal Regulations, Section 1.362(d), effective Nov. 1, 1984, provides that maintenance fees may be paid without surcharge for a six-month period beginning 3, 7, and 11 years after the date of issue of patents based on application filed on or after Dec. 12, 1980. An additional six-month grace period is provided by 35 U.S.C. 41(b) and 37 CFR 1.362(e) for payment of the maintenance fee with the surcharge set forth in 37 CFR 1.20(k) or (l), as amended effective Apr. 17, 1989. If the maintenance fee is not paid in a patent requiring such payment the patent will expire on the 4th, 8th or 12th anniversary of the patent.

Attention is drawn to the patents which were issued on January 19, 1988 for which maintenance fees due at 3 years and six months may now be paid. The patents have patent numbers within the following ranges:

Utility Patents 4,719,650 through 4,720,873
Reissue Patents based on the above identified patents.

Attention is drawn to the patents which were issued on January 17, 1984 for which maintenance fees due at 7 years and six months may now be paid. The patents have patent numbers within the following ranges:

Utility Patents 4,425,667 through 4,426,738
Reissue Patents based on the above identified patents.

No maintenance fees are required for design or plant patents.

Payments of maintenance fees in patents should be directed to "Commissioner of Patents and Trademarks, Box M. Fee, Washington, D.C. 20231."

The current amounts of the maintenance fees due at 3 years and six months and seven years and six months are set forth in 37 CFR 1.20(e), and (f), as amended Nov. 5, 1990, which are reproduced below:

37 CFR § 1.20 Post-issuance fees and surcharges

"(e) For maintaining an original or reissue patent, except a design or plant patent, based on an application filed on or after after Dec. 12, 1980 and before Aug. 27, 1982, in force beyond 4 years; the fee is due by three years and six months after the original grant.....$245.00

"(f) For maintaining an original or reissue patent, except a design or plant patent, based on an application filed on or after Dec. 12, 1980 and before Aug. 27, 1982, in force beyond 8 years; the fee is due by seven years and six months after the original grant.....$495.00"

"(h) For maintaining an original or reissue patent except a design or plant patent, based on an application filed on or after Aug. 27,1982, in force beyond 4 years; the fee is due by three years and six months after the original grant:

By a small entity (§1.9(f)).....$415.00
By other than a small entity.....$850.00"

"(i) For maintaining an original or reissue patent, except a design or plant patent, based on an application filed on or after Aug. 27, 1982, in force beyond 8 years; the fee is due by seven years and six months after the original grant:

By a small entity (§1.9(f)).....$835.00
By other than a small enttity.....$1670.00"

The amounts of the surcharges for paying the maintenance fee during the grace period or after the expiration of the patent are set forth in 37 CFR 1.20(k), (l) and (m), which are reproduced below:

"(k) Surcharge for paying a maintenance fee during the 6-month grace period following the expiration of three years and six months , seven years and six months, and eleven years and six months after the date of the original grant of a patent based on an application filed on or after Dec. 12, 1980 and before Aug. 27,1982.....$120.00"

"(l) Surcharge for paying a maintenance fee during the 6-month grace period following the expiration of three years and six months, seven years and six months, and eleven years and six months after the date of the original grant of a patent based on an application filed on or after Aug. 27, 1982:

By a small entity(§1.9(f)).....$60.00
By other than a small entity.....$120.00"

"(m) Surcharge for accepting a maintenance fee after expiration of a patent for non-timely payment of a maintenance fee where the delay is shown to the satisfaction of the Commissioner to have been unavoidable.....$550.00"

Notice of Expiration of Patents Due to Failure to Pay Maintenance Fees

35 U.S.C. 41 and 37 CFR 1.362(g) provide that if the required maintenance fee and any applicable surcharge are not paid in a patent requiring such payment, the patent will expire at the end of the 4th, 8th, or 12th anniversary of the grant of the patent depending on the first maintenance fee which was not paid.

According to the records of the Office, the patents listed below have expired due to failure to pay the required maintenance fee and any applicable surcharge.

PATENTS WHICH EXPIRED NOVEMBER 11, 1990 DUE TO FAILURE TO PAY MAINTENANCE FEES

Patent Number	Serial Number	Issue Date
4,357,717	06/234,611	11/09/82
4,357,737	06/229,137	11/09/82
4,357,759	06/231,185	11/09/82
4,357,763	06/227,481	11/09/82
4,357,765	06/281,442	11/09/82
4,357,769	06/243,172	11/09/82
4,357,791	06/243,139	11/09/82
4,357,823	06/249,979	11/09/82
4,357,842	06/223,128	11/09/82
4,357,872	06/227,376	11/09/82
4,357,883	06/291,600	11/09/82
4,357,890	06/249,437	11/09/82
4,357,899	06/325,243	11/09/82
4,357,900	06/250,656	11/09/82
4,357,904	06/269,962	11/09/82
4,357,906	06/289,729	11/09/82
4,357,911	06/221,350	11/09/82
4,357,937	06/277,658	11/09/82
4,357,949	06/268,144	11/09/82
4,357,959	06/302,042	11/09/82
4,357,983	06/226,423	11/09/82
4,358,020	06/221,835	11/09/82
4,358,058	06/230,021	11/09/82
4,358,101	06/265,406	11/09/82
4,358,111	06/250,505	11/09/82
4,358,119	06/225,735	11/09/82
4,358,131	06/223,370	11/09/82
4,358,146	06/230,753	11/09/82
4,358,150	06/247,494	11/09/82
4,358,160	06/251,404	11/09/82
4,358,162	06/287,994	11/09/82
4,358,184	06/237,688	11/09/82
4,358,209	06/235,782	11/09/82
4,358,267	06/247,551	11/09/82
4,358,269	06/241,580	11/09/82
4,358,277	06/277,820	11/09/82
4,358,287	06/253,683	11/09/82
4,358,296	06/239,209	11/09/82
4,358,297	06/222,054	11/09/82
4,358,300	06/270,994	11/09/82
4,358,309	06/247,711	11/09/82
4,358,325	06/244,931	11/09/82
4,358,337	06/324,038	11/09/82
4,358,343	06/340,271	11/09/82
4,358,350	06/270,211	11/09/82
4,358,361	06/286,433	11/09/82
4,358,370	06/251,699	11/09/82
4,358,371	06/251,802	11/09/82
4,358,380	06/247,278	11/09/82
4,358,385	06/291,581	11/09/82
4,358,386	06/291,584	11/09/82
4,358,387	06/291,582	11/09/82
4,358,392	06/237,735	11/09/82
4,358,397	06/221,602	11/09/82
4,358,403	06/292,223	11/09/82
4,358,404	06/237,170	11/09/82
4,358,407	06/295,578	11/09/82
4,358,413	06/227,652	11/09/82
4,358,422	06/259,409	11/09/82
4,358,425	06/235,328	11/09/82
4,358,426	06/217,357	11/09/82
4,358,429	06/308,966	11/09/82
4,358,439	06/216,353	11/09/82
4,358,441	06/265,348	11/09/82
4,358,459	06/217,443	11/09/82
4,358,460	06/248,928	11/09/82
4,358,488	06/223,761	11/09/82

Patent Number	Serial Number	Issue Date
4,358,497	06/239,894	11/09/82
4,358,500	06/294,771	11/09/82
4,358,518	06/240,070	11/09/82
4,358,524	06/310,720	11/09/82
4,358,526	06/293,897	11/09/82
4,358,527	06/324,214	11/09/82
4,358,531	06/309,972	11/09/82
4,358,532	06/283,412	11/09/82
4,358,551	06/284,165	11/09/82
4,358,554	06/233,068	11/09/82
4,358,555	06/269,082	11/09/82
4,358,571	06/242,216	11/09/82
4,358,583	06/287,807	11/09/82
4,358,586	06/219,435	11/09/82
4,358,603	06/254,824	11/09/82
4,358,610	06/239,756	11/09/82
4,358,615	06/252,459	11/09/82
4,358,617	06/305,534	11/09/82
4,358,621	06/266,646	11/09/82
4,358,630	06/221,963	11/09/82
4,358,637	09/274,460	11/09/82
4,358,646	06/223,350	11/09/82
4,358,745	06/244,196	11/09/82
4,358,767	06/220,488	11/09/82
4,358,777	06/221,002	11/09/82
4,358,779	06/250,012	11/09/82
4,358,808	06/264,243	11/09/82
4,358,809	06/262,283	11/09/82
4,358,811	06/239,977	11/09/82
4,621,379	06/689,397	11/11/86
4,621,386	06/675,201	11/11/86
4,621,393	06/780,166	11/11/86
4,621,395	06/686,417	11/11/86
4,621,403	06/611,648	11/11/86
4,621,408	06/698,764	11/11/86
4,621,428	06/693,395	11/11/86
4,621,429	06/761,028	11/11/86
4,621,430	06/803,111	11/11/86
4,621,432	06/751,312	11/11/86
4,621,435	06/681,944	11/11/86
4,621,438	06/457,528	11/11/86
4,621,439	06/763,412	11/11/86
4,621,446	06/816,293	11/11/86
4,621,448	06/707,896	11/11/86
4,621,449	06/652,755	11/11/86
4,621,451	06/787,081	11/11/86
4,621,458	06/785,489	11/11/86
4,621,461	06/673,491	11/11/86
4,621,468	06/629,980	11/11/86
4,621,471	06/814,424	11/11/86
4,621,473	06/519,850	11/11/86
4,621,476	06/761,954	11/11/86
4,621,477	06/756,292	11/11/86
4,621,480	06/632,091	11/11/86
4,621,485	06/749,878	11/11/86
4,621,489	06/721,214	11/11/86
4,621,515	06/556,240	11/11/86
4,621,526	06/623,733	11/11/86
4,621,528	06/716,833	11/11/86
4,621,530	06/630,672	11/11/86
4,621,552	06/689,078	11/11/86
4,621,556	06/608,345	11/11/86
4,621,562	06/499,257	11/11/86
4,621,565	06/641,056	11/11/86
4,621,566	06/789,155	11/11/86
4,621,573	06/647,672	11/11/86
4,621,581	06/707,313	11/11/86
4,621,582	06/710,990	11/11/86
4,621,586	06/731,169	11/11/86
4,621,587	06/667,009	11/11/86
4,621,588	06/811,427	11/11/86
4,621,590	06/768,482	11/11/86
4,621,607	06/677,468	11/11/86
4,621,608	06/721,081	11/11/86
4,621,609	06/644,287	11/11/86
4,621,610	06/696,652	11/11/86
4,621,616	06/732,982	11/11/86
4,621,617	06/383,618	11/11/86
4,621,620	06/600,502	11/11/86
4,621,621	06/702,981	11/11/86
4,621,623	06/694,781	11/11/86
4,621,626	06/686,779	11/11/86
4,621,628	06/648,015	11/11/86
4,621,640	06/569,448	11/11/86
4,621,642	06/711,847	11/11/86
4,621,644	06/599,968	11/11/86
4,621,647	06/613,314	11/11/86
4,621,649	06/629,825	11/11/86
4,621,660	06/786,812	11/11/86
4,621,674	06/571,205	11/11/86
4,621,684	06/693,336	11/11/86
4,621,697	06/710,049	11/11/86
4,621,711	06/679,007	11/11/86
4,621,715	06/710,227	11/11/86
4,621,723	06/673,391	11/11/86
4,621,726	06/586,208	11/11/86
4,621,732	06/744,347	11/11/86
4,621,737	06/590,007	11/11/86
4,621,738	06/501,877	11/11/86
4,621,741	06/812,382	11/11/86
4,621,752	06/753,918	11/11/86
4,621,753	06/700,719	11/11/86
4,621,767	06/570,134	11/11/86
4,621,770	06/568,821	11/11/86
4,621,781	06/734,489	11/11/86
4,621,783	06/596,400	11/11/86
4,621,798	06/609,544	11/11/86
4,621,806	06/700,554	11/11/86
4,621,810	06/728,310	11/11/86
4,621,815	06/670,997	11/11/86
4,621,825	06/617,992	11/11/86
4,621,826	06/766,699	11/11/86
4,621,828	06/655,039	11/11/86
4,621,829	06/447,864	11/11/86
4,621,841	06/779,307	11/11/86
4,621,846	06/656,521	11/11/86
4,621,848	06/699,040	11/11/86
4,621,851	06/803,095	11/11/86
4,621,852	06/690,986	11/11/86
4,621,853	06/676,058	11/11/86
4,621,856	06/754,153	11/11/86
4,621,857	06/735,956	11/11/86
4,621,860	06/624,252	11/11/86
4,621,862	06/663,245	11/11/86
4,621,863	06/819,582	11/11/86
4,621,865	06/640,746	11/11/86
4,621,866	06/760,954	11/11/86
4,621,869	06/708,976	11/11/86
4,621,870	06/731,879	11/11/86
4,621,887	06/241,802	11/11/86
4,621,894	06/744,366	11/11/86
4,621,895	06/617,227	11/11/86
4,621,907	06/657,928	11/11/86
4,621,908	06/658,936	11/11/86
4,621,912	06/701,407	11/11/86
4,621,915	06/680,627	11/11/86
4,621,922	06/640,085	11/11/86
4,621,928	06/714,077	11/11/86
4,621,931	06/562,613	11/11/86
4,621,938	06/829,132	11/11/86
4,621,956	06/656,181	11/11/86
4,621,962	06/669,911	11/11/86
4,621,964	06/677,555	11/11/86
4,621,965	06/576,940	11/11/86
4,621,972	06/702,478	11/11/86
4,621,982	06/797,187	11/11/86
4,621,984	06/724,293	11/11/86
4,621,987	06/709,314	11/11/86
4,621,990	06/707,460	11/11/86
4,622,002	06/633,530	11/11/86
4,622,008	06/679,524	11/11/86
4,622,012	06/716,489	11/11/86
4,622,017	06/614,739	11/11/86
4,622,018	06/719,722	11/11/86
4,622,019	06/782,595	11/11/86
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4,622,021	06/790,979	11/11/86
4,622,022	06/773,523	11/11/86
4,622,027	06/674,450	11/11/89
4,622,035	06/693,874	11/11/86
4,622,039	06/712,269	11/11/86
4,622,046	06/431,585	11/11/86
4,622,051	06/807,439	11/11/86
4,622,057	06/734,917	11/11/86
4,622,061	06/491,477	11/11/86
4,622,064	06/810,104	11/11/86
4,622,068	06/797,294	11/11/86
4,622,075	06/797,158	11/11/86
4,622,080	06/843,865	11/11/86
4,622,135	06/665,556	11/11/86
4,622,138	06/678,337	11/11/86
4,622,144	06/622,976	11/11/86
4,622,151	06/682,050	11/11/86
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4,622,177	06/530,752	11/11/86
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4,622,380	06/746,805	11/11/86
4,622,382	06/753,194	11/11/86
4,622,386	06/717,045	11/11/86
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4,622,388	06/797,074	11/11/86
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4,622,510	06/514,816	11/11/86
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4,622,568	06/608,402	11/11/86
4,622,569	06/618,537	11/11/86
4,622,579	06/598,681	11/11/86
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4,622,626	06/785,870	11/11/86
4,622,629	06/660,150	11/11/86
4,622,646	06/528,224	11/11/86
4,622,681	06/604,065	11/11/86
4,622,684	06/577,037	11/11/86
4,622,689	06/697,499	11/11/86

REISSUE APPLICATIONS FILED

Notice under 37 CFR 1.11(b). The reissue applications listed below are open to inspection by the general public in the indicated Examining Groups and copies may be obtained by paying the fee therefor (37 CFR 1.21(b).

4,813,054, Re. S. N. 07/620,846, Filed Nov. 13, 1990, Cl. 372/096, DISTRIBUTED FEEDBACK LASER, Richard G. S. Plumb, Owner of Record: *STC PLC, London, England*, Attorney or Agent: William M. Lee, Ex. Gp.: 251

REQUESTS FOR REEXAMINATION FILED

Notice under 37 CFR 1.11(c). The requests for reexamination listed below are open to inspection by the general public in the indicated Examining Groups. Copies of the requests and related papers may be obtained by paying the fee therefor established in the Rules (37 CFR 1.19(a).

In the event correspondence to the patent owner is not received, this notice will be considered to be constructive notice to the patent owner and reexamination will proceed (37 CFR 1.248(a)(5) and 1.525(b).

4,260,005, Reexam. No. 90/002,222, Requested Dec. 6, 1990, Cl. 411/003, SELF-LOCKING FASTENER, FASTENER SYSTEM AND PROCESS, Edgar L. Stencel, Owner of Record: *VSI Corp., Carson, Calif.*, Attorney or Agent: Christie, Parker & Hale, Pasadena, Calif., Ex. Gp.: 352, Requester: Owner

4,383,353, Reexam. No. 90/002,221, Requested Dec. 6, 1990, Cl. 029/517, PROCESS OF FORMING A JOINT WITH A PREDETERMINED CLAMP-UP LOAD, Edgar L. Stencel, Owner of Record: *VSI Corp., Carson, Calif.*, Attorney or Agent: Christie, Parker & Hale, Pasadena, Calif., Ex. Gp.: 321, Requester: Owner

4,522,350, Reexam. No. 90/002,220, Requested Dec. 7, 1990, Cl. 242/107.40A, SAFTEY BELT EMERGENCY LOCKING RETRACTOR, Hans-Helmut Ernst, Owner of Record: *Britax-Kolb & Co., Erdweg, Fed'l. Rep. of Germany*, Attorney or Agent: Anthony M. Davis, Manchester, N. H., Ex. Gp.: 245, Requester: James A. Kushman, Brooks & Kushman, Southfield, Mich.

4,887,087, Reexam. No. 90/002,218, Requested Dec. 5, 1990, Cl. 342/061, METHOD OF DISPLAYING DETECTED INFORMATION ABOUT A ROTATING MASS, Walter A. Clearwater, Owner of Record: *Micro Control Tech., Ltd., Hampshire, England*, Attorney or Agent: Thomas K. Stine, Wallenstein, Wagner & Hattis, Chicago, Ill., Ex. Gp.: 222, Requester: Owner

4,893,422, Reexam. No. 90/002,219, Requested Dec. 6, 1990, Cl. 038/077.300, STEAM IRON WITH WATER SOFTENING FACILITY, Gotthard C. Mahlick, et al., Owner of Record: *Robert Krups, Stiftung & Co., KG, Salinger, Fed'l. Republic of Germany*, Attorney or Agent: Peter K. Kontler, Stamford, Conn, Ex. Gp.: 247, Requester: Owner

Service by Publication

A petition to cancel the registration identified below having been filed, and the notice of such proceeding sent by registered

mail to registrant at the last known address having been returned by the Postal Service as undeliverable, notice is hereby given that unless the registrant listed herein, its assigns or legal representatives shall enter an appearance within thirty days from the date of this publication, the cancellation will be proceeded with as in the case of default.

Alpha Arms, Inc., Dallas, Tex., Reg. No. 1,344,265, for the mark "ALPHA GRAND SLAM", Canc. No. 19,138.

JEAN BROWN,
Administrator, Trademark Trial and Appeal Board
For JEFFREY M. SAMUELS
Assistant Commissioner for Trademarks

Certificates of Correction For Week of January 22, 1991

B14,715,396	4,855,059	4,876,816	4,894,055
D. 302,788	4,855,349	4,879,073	4,894,810
D. 309,634	4,856,242	4,879,134	4,895,210
D. 310,251	4,857,623	4,879,759	4,895,554
4,744,237	4,858,893	4,880,832	4,895,633
4,762,786	4,858,927	4,880,920	4,898,435
4,784,965	4,859,070	4,881,038	4,899,305
4,795,262	4,860,816	4,881,046	4,899,770
4,801,154	4,861,510	4,881,404	4,900,463
4,807,259	4,861,768	4,881,556	4,900,559
4,810,289	4,862,077	4,882,179	4,901,649
4,811,380	4,862,952	4,882,509	4,901,674
4,811,958	4,865,722	4,882,689	4,902,154
4,820,816	4,866,059	4,882,756	4,902,398
4,821,775	4,866,106	4,883,412	4,902,842
4,822,467	4,867,625	4,883,505	4,903,124
4,824,557	4,867,743	4,884,629	4,905,306
4,825,814	4,868,505	4,884,955	4,905,876
4,839,668	4,869,635	4,885,204	4,906,129
4,841,050	4,871,439	4,885,381	4,909,006
4,843,088	4,871,786	4,885,641	4,911,628
4,844,730	4,872,204	4,886,774	4,912,282
4,844,791	4,873,000	4,886,901	4,922,300
4,847,641	4,873,102	4,888,396	4,925,417
4,847,743	4,873,909	4,889,580	4,931,028
4,848,203	4,874,210	4,889,859	4,933,512
4,848,211	4,874,910	4,890,444	4,935,773
4,848,975	4,875,231	4,891,370	4,938,105
4,850,400	4,876,102	4,892,020	4,945,707
4,852,431	4,876,126	4,892,400	4,951,681
4,853,327	4,876,406	4,893,116	4,955,518
4,854,416	4,876,537	4,893,139	
4,854,623	4,876,664	4,893,809	
4,854,897	4,876,735	4,893,945	

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	Toledo/Lucas County Public Library	(419) 259-5212
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PATENT EXAMINING CORPS

JAMES E. DENNY, Acting Assistant Commissioner
STEPHEN G. KUNIN, Acting Deputy Assistant Commissioner
CONDITION OF PATENT APPLICATIONS AS OF December 1, 1990

PATENT EXAMINING GROUPS	Actual Filing Date of Oldest New Case Awaiting Action
CHEMICAL EXAMINING GROUPS	
GENERAL METALLURGICAL, INORGANIC, PETROLEUM AND ELECTRICAL CHEMISTRY, AND ENGINEERING, GROUP 110—D. E. TALBERT, Director.	12-4-87
ORGANIC CHEMISTRY GROUP 120—JOHN F. TERAPANE, JR., Director	4-24-88
SPECIALIZED CHEMICAL INDUSTRIES AND CHEMICAL ENGINEERING, GROUP— 130 BARRY S. RICHMAN, Director	2-27-89
HIGH POLYMER CHEMISTRY, PLASTICS, COATING, PHOTOGRAPHY, STOCK MATERIALS AND COMPOSITIONS, GROUP 150—J. O. THOMAS, Director	1-31-89
BIOTECHNOLOGY, GROUP 180—EDWARD E. KUBASIEWICZ, Director	3-21-88
ELECTRICAL EXAMINING GROUPS	
INDUSTRIAL ELECTRONICS, PHYSICS AND RELATED ELEMENTS, GROUP 210—D. G. Kelly, Director	3-28-89
SPECIAL LAWS ADMINISTRATION, GROUP 220—ROBERT E. GARRETT, Director	3-17-89
INFORMATION PROCESSING, STORAGE, AND RETRIEVAL, GROUP 230—G. GOLDBERG, Director	9-19-88
PACKAGES, CLEANING, TEXTILES, AND GEOMETRICAL INSTRUMENTS, GROUP 240—TRYGVE M. BLIX,Director	8-14-89
ELECTRONIC AND OPTICAL SYSTEMS AND DEVICES, GROUP 250—JOSEPH J. ROLLA, Director.	4-24-89
COMMUNICATIONS, MEASURING, TESTING AND LAMP/DISCHARGE GROUP, GROUP— 260 STEWART LEVY, Acting Director	1-30-89
DESIGN, GROUP 290—ROBERT E. GARRETT, Director	7-1-87
MECHANICAL EXAMINING GROUPS	
HANDLING AND TRANSPORTING MEDIA, GROUP 310—B. R. GRAY, Director	12-7-89
MATERIAL SHAPING, ARTICLE MANUFACTURING AND TOOLS, GROUP 320—N. GODICI, Director	5-11-89
MECHANICAL TECHNOLOGIES AND HUSBANDRY PERSONAL TREATMENT INFORMATION, GROUP 330—J. J. LOVE, Director	7-24-89
SOLAR, HEAT, POWER, AND FLUID ENGINEERING DEVICES, GROUP 340—C. CROYLE, Acting Director	7-6-89
GENERAL CONSTRUCTIONS, PETROLEUM AND MINING ENGINEERING, GROUP 350— A. L. SMITH, Director	1-2-90

Expiration of patents: The patents within the range of numbers indicated below expire during December 1990 except those which may have had their terms curtailed by disclaimer under the provisions of 35 U.S.C. 253. Other patents, issued after the dates of the range of numbers indicated below, may have expired before the full term of 17 years for the same reasons, or have lapsed under the provisions of 35 U.S.C. 151.

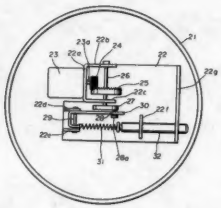
Patents ..... Numbers 3,775,774 to 3,778,913 inclusive
Plant Patents ..... none

REEXAMINATIONS

JANUARY 22, 1991

Matter enclosed in heavy brackets [ ] appears in the patent but forms no part of this reexamination specification; matter printed in italics indicates additions made by reexamination.

B1 4,271,093 (1406th)
CARBURETOR
Takeshi Kobayashi, Kawasaki, Japan, assignor to Walbro Far East, Inc.
Reexamination Request No. 90/002,101, Aug. 3, 1990.
Reexamination Certificate for Patent No. 4,271,093, issued Jun. 2, 1981, Ser. No. 90,425, Nov. 1, 1979.
Claims priority, application Japan, Nov. 20, 1978, 53-142177
Int. Cl.[5] F02M *1/16*
U.S. Cl. 261—34.1



AS A RESULT OF REEXAMINATION, IT HAS BEEN DETERMINED THAT:

The patentability of claim 1 is confirmed.

1. In a diaphragm carburetor having a body with a fuel supply port, a diaphragm chamber open to said fuel supply port formed in said body for supplying fuel to an internal combustion engine through main and idle fuel jets in the carburetor, a diaphragm controlled fuel inlet valve in said body connected to said fuel supply port, a pump chamber in said body, one side of which is formed by the body and the other side of which is formed by a manually compressible resilient dome sealed peripherally against said body and accessible from the outside of said body, a first passage in said body leading from the diaphragm chamber to said pump chamber having a first one-way valve opening in the direction from said diaphragm chamber to said pump chamber, a second passage in said body leading from said pump chamber to an outlet port open to atmosphere having a second one-way valve opening in the direction from said pump chamber to said outlet port,

said dome being manually compressible to create a suction in said diaphragm chamber to draw a starting charge of fuel into said diaphragm chamber when said engine is not operating, said first one-way valve serving to block flow through said first passage when said carburetor is operating normally with the engine running.

REISSUES

JANUARY 22, 1991

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates additions made by reissue.

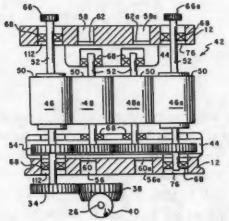
Re. 33,522
CONVERSION OF LETTERPRESS TO OFFSET PRINTING

Carl J. Hermach, Largo, Fla., and Duane H. Houy, Dallas, Tex., assignors to Publishers Equipment Corporation, Dallas, Tex.

Original No. 4,768,436, dated Sep. 6, 1988, Ser. No. 873,121, Jun. 11, 1986. Continuation of Ser. No. 685,225, Dec. 27, 1984, abandoned, which is a continuation of Ser. No. 142,641, Apr. 22, 1980, abandoned, which is a division of Ser. No. 32,240, Apr. 20, 1979, abandoned. Application for reissue Oct. 28, 1988, Ser. No. 264,164

Int. Cl.[5] B41F *7/02, 13/28*

U.S. Cl. 101—143 **8 Claims**



1. An offset printing press unit comprising:

(a) a main frame including a pair of spaced apart walls defining first pairs of aligned cylindrical bearing receiving bores in spaced apart relation and second pairs of aligned cylindrical bearing receiving bores in spaced relation to each other and disposed intermediate said first pairs of aligned bores;

(b) cylinder receiving means at least a portion of which is intermediate said main frame walls including a first portion fixedly secured to one of said walls and a second portion fixedly secured to the other thereof, said cylinder receiving means being adapted to rotatably support at least one printing cylinder;

(c) a pair of plate cylinders at least one of which is rotatably supported within one of said first pairs of aligned bores in said main frame;

(d) a pair of blanket cylinders rotatably supported upon one of said main frame and cylinder receiving means, each in contact with the other and with one of said plate cylinders with at least one of said blanket cylinders rotatably supported upon said cylinder receiving means;

(e) the axes of rotation of said pair of blanket cylinders being spaced apart a distance less than the distance between *the axes of* said second pairs of aligned bores in said main frame.

Re. 33,523
HEATED COVER FOR PIPELINE BACKFLOW PREVENTER COMPONENT ASSEMBLY

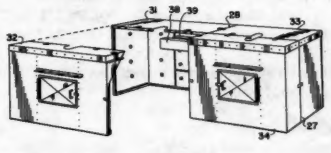
Michael J. Devine, Jacksonville, Fla., assignor to Commercial Insulation Company, Jacksonville, Fla.

Original No. 4,726,394, dated Feb. 23, 1988, Ser. No. 37,726, Apr. 13, 1987. Application for reissue Nov. 13, 1989, Ser. No. 434,418

Int. Cl.[5] F16K *49/00*

U.S. Cl. 137—341 **30 Claims**

1. A heated cover for pipeline valve and backflow preventer components above ground comprising an assemblable insulated housing having side walls and a top wall and adapted to substantially enclose the components with an open bottom of said housing to permit the pipeline to pass through upstream and downstream of the components, said housing being substantially spaced outwardly from the components, an electric heating element disposed within said housing, means to supply electric power to said element, spaced openings passed through at least opposed said side walls of said housing adjacent said open bottom to drain water discharged from the components from within and outwardly of said housing, said housing being formed of sectionalized portions which are assemblable into a complete cover around the components, said housing having an opening formed in said top wall between said sectionalized portions through which a stem of a manually closeable valve extends outwardly thereof for manipulation of the valve without removal of said cover.



21. A heated cover for pipeline valve and backflow preventer components above ground comprising an insulated housing having side walls and a top wall and adapted to substantially enclose the components with an open bottom of said housing adapted to be supported by the ground and to permit the pipeline to pass through upstream and downstream of the components, said housing being substantially spaced outwardly from the components, an electric heating element disposed within said housing, means to supply electric power to said element, said housing having at least one opening passing through at least one said side wall adjacent said open bottom to drain water discharged from the components from within through said opening and outwardly of said housing, said housing having at least one access door openable from outside said cover for providing access to and inspection and testing of the components without removal of said cover from around the components.

Re. 33,524
PARTICLE SEPARATION

Cornelius J. Schram, Bedford, United Kingdom, assignor to National Research Development Corporation, London, England

Original No. 4,673,512, dated Jun. 16, 1987, Ser. No. 751,951, Jul. 5, 1985. Application for reissue Sep. 2, 1988, Ser. No. 240,203

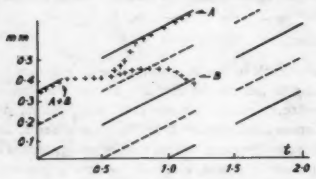
Claims priority, application United Kingdom, Jul. 6, 1984, 8417240

Int. Cl.[5] B01D *17/06;* C02F *1/36*

U.S. Cl. 210—748 **8 Claims**

1. In a method of separating different types of particles in which an ultrasonic standing wave having an axis of propagation, and a series of nodes transverse to the axis is propagated in a liquid medium and there is relative motion between the medium and the standing wave, the different types of particles being differently influenced by the acoustic energy of the standing wave and/or the Stokes or drag forces of the fluid medium, the improvement comprising cyclically varying the energy propagation of said standing wave *by moving the standing wave at a cyclically varying rate* so that the different particle

types are caused to move at [cyclically varying] *different* rates in the direction of the axis of propagation and thereby



progressively separating said different particle types while [remaining] *they remain* suspended in the liquid medium.

Re. 33,525

TRANSFER RECORDING METHOD AND APPARATUS THEREFOR

Tadao Kohashi, Moriguchi, Japan, assignor to Matsushita Electric Industrial Co., Ltd., Kadoma, Japan

Original No. 4,541,042, dated Sep. 10, 1985, Ser. No. 659,956, Oct. 11, 1984. Continuation of Ser. No. 94,771, Sep. 10, 1987, abandoned. Application for reissue Oct. 3, 1989, Ser. No. 418,726

Claims priority, application Japan, Oct. 14, 1983, 58-192797; Mar. 22, 1984, 59-55424

Int. Cl.[5] G01D *15/00*

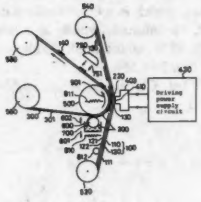
U.S. Cl. 346—76 PH **35 Claims**

1. Transfer recording method comprising the steps of:

driving a recording medium in a predetermined direction,

driving a recording material sheet, which comprises a base film and a recording material layer coated on one face of said base film, in substantially the same direction as that of said recording medium, in a state that the surface of said recording material layer is press-contacting to a face of said recording medium at least at a region whereon recording is to be made,

applying a solvent in liquid state on at least one of said recording material layer and said recording medium, prior to said press-contacting of said surface of recording material layer to said face of said recording medium, said solvent having a lower melting point than a melting-transfer temperature of said recording material layer and such a solubility characteristic as to dissolve at least one component of said recording material, said solubility characteristic being that solubility increases as temperature rises,



heating selected points of said recording material layer to a predetermined temperature thereby thermo-dissolving said selected points of said recording material layer by said solvent which is of or is made to liquid state,

thereby selectively transferring thermo-dissolved selected points of said recording material layer onto said face of said recording medium, during a period of said heating to said predetermined temperature.

PLANT PATENTS

GRANTED JANUARY 22, 1991

Illustrations for plant patents are usually in color and therefore it is not practicable to reproduce the drawing.

7,424

MINIATURE ROSE PLANT NAMED SAVABEAR

F. Harmon Saville, Rowley, Mass., assignor to Nor'East Miniature Roses, Inc., Rowley, Mass.

Filed Sep. 20, 1989, Ser. No. 410,160
Int. Cl.[5] A01H *5/00*
U.S. Cl. Plt.—7 1 Claim

1. A new and distinct variety of rose plant of the miniature rose class, substantially as shown and described, characterized particularly by attractive orange brown flowers.

7,425

KALANCHOE PLANT NAMED SMALL WONDER

Margaret M. Fleming, Soquel, Calif., assignor to The Plant Company, Soquel, Calif.

Filed Oct. 16, 1989, Ser. No. 422,086
Int. Cl.[5] A01H *5/00*
U.S. Cl. Plt.—68 1 Claim

1. A new and distinct plant of Kalanchoe named Small Wonder, as described and illustrated.

7,426

KALANCHOE PLANT NAMED RADIANCE

Margaret M. Fleming, Soquel, Calif., assignor to The Plant Company, Soquel, Calif.

Filed Oct. 16, 1989, Ser. No. 422,087
Int. Cl.[5] A01H *5/00*
U.S. Cl. Plt.—68 1 Claim

1. A new and distinct plant of Kalanchoe named Radiance, as described and illustrated.

7,427

KALANCHOE PLANT NAMED GREMLIN

Margaret M. Fleming, Soquel, Calif., assignor to The Plant Company, Soquel, Calif.

Filed Oct. 16, 1989, Ser. No. 422,088
Int. Cl.[5] A01H *5/00*
U.S. Cl. Plt.—68 1 Claim

1. A new and distinct plant of Kalanchoe named Gremlin, as described and illustrated.

7,428

LILY PLANT NAMED DAME BLANCHE

Pieter C. Schenk, Medemblik, Netherlands, assignor to H.J.A. Rooijakkers B.V., Netherlands

Filed Feb. 16, 1990, Ser. No. 481,065
Int. Cl.[5] A01H *5/00*
U.S. Cl. Plt.—68 1 Claim

1. A new and distinct cultivar of lily plant named Dame Blanche, as illustrated and described.

7,429

BAHIAGRASS PLANT 'B-1'

William E. Moran, 1703 Zipperer Rd., Bradenton, Fla. 34202

Filed Sep. 12, 1989, Ser. No. 406,433
Int. Cl.[5] A01H *5/00*
U.S. Cl. Plt.—89 1 Claim

1. A new and distinct genotype of bahiagrass plant, B-1, substantially as herein described and illustrated, characterized particularly as being prostrate to decumbent (dwarf) in growth habit, faster rate of lateral spread, attractive dark green yellowish color designated 7.5 GY 4/4 and producing prostrate to decumbent flowering culms.

PATENTS

GRANTED JAN. 22, 1991

ERRATA

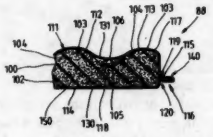
For CLASS	See PATENT NO.
452-187	4,985,963
452-135	4,985,964
452-161	4,985,965
100-163	4,986,177
100-174	4,986,178
102-493	4,986,188
175-394	4,986,368
251-216	4,986,502
297-362	4,986,514
417-057	4,986,727
417-443	4,986,728
312-206	4,986,759
439-074	4,986,778
439-108	4,986,779
239-074	4,986,782
440-900	4,986,783
524-413	4,987,164
526-243	4,987,209
526-258	4,987,210
526-329	4,987,211
526-348	4,987,212
527-301	4,987,213
392-375	4,987,290
315-382	4,987,350
357-008	4,987,430
357-067	4,987,562

PATENTS

GRANTED JANUARY 22, 1991

GENERAL AND MECHANICAL

4,985,931
SHOCK ABSORBING PAD STRUCTURE FOR ATHLETIC EQUIPMENT
James C. Wingo, Jr., Houston, Tex., assignor to Riddell, Inc., Chicago, Ill.
Filed Oct. 17, 1989, Ser. No. 424,069
Int. Cl.[5] A41D *13/00*
U.S. Cl. 2—2 **30 Claims**

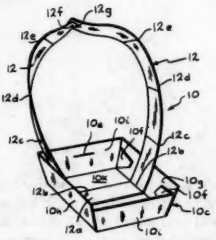


1. A shock absorbing pad structure for athletic equipment comprising:

a flexible enclosure, having first and second faces and a periphery, defining a cavity, the first and second faces and periphery being substantially air impermeable and the enclosure having at least one air permeable portion; and

a flexible foam member disposed within the cavity, the foam member having at least one surface disposed adjacent one of the faces of the enclosure, the at least one surface of the foam member having an undulated configuration formed by a plurality of elevations and depressions arranged in an alternating, staggered relationship with respect to one another.

4,985,932
FOOD SPILL CATCHING AND SERVING DEVICE
William J. Bezdek, 2861 Hagadorn Rd., Mason, Mich. 48854
Filed Apr. 30, 1990, Ser. No. 516,446
Int. Cl.[5] A41B *13/10*; A41D *13/04*
U.S. Cl. 2—049 A **13 Claims**

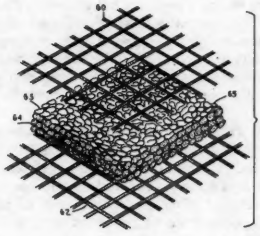


1. A protective device for collecting food spills adapted to be positioned on a front body portion of a person in an upper chest area to catch the spills from the mouth of the person which comprises:

(a) a rigid tray having a bottom, a front side away from the body portion, a back side adjacent to the upper chest area and opposite ends connecting the sides and the bottom to form the tray with a recess inside the tray for catching spills; and

(b) a strap means formed separately of the tray mounted across the bottom of the tray in the recess and adjacent the opposite ends of the tray, which strap means extends to and fastens around the neck of the person, wherein in use food falls from the mouth by gravity into the recess in the tray.

4,985,933
VENTILATED BEEKEEPER SUIT
Philip G. Lemoine, 801 Little Farms Ave., Metairie, La. 70003
Filed Aug. 16, 1988, Ser. No. 232,674
Int. Cl.[5] A41D *13/00*; A42B *3/00*
U.S. Cl. 2—84 **3 Claims**



1. A ventilated beekeepers suit, of the type having a principal body portion, arm and leg portions, and a hood portion, the suit comprising an integral suit body formed from a substantially uniform flexible multi-layered material, wherein said material comprises;

(a) a first outside fabric layer of medium net having a pore count in the range of 0.2–1 centimeters per opening;

(b) a second inside fabric layer of medium woven mesh having a pore count in the range of 0.2–1 centimeters per opening;

(c) an intermediate layer of polyurethane open cell material of sufficient thickness to serve as a protective barrier against bee stings, having a pore count in the range of approximately 7–20 pores per linear inch or 49–400 pores per square inch;

the outside fabric layer, the intermediate polyurethane layer, and the inside fabric layer defining a multi-layered composite material for protecting a beekeeper from stings, yet of sufficient spacing for allowing air to ventilate between outside of the suite and skin of the wearer.

4,985,934

SPORTS SLEEVE

George W. Perry, 229 W. Regent St., #4, Inglewood, Calif. 90301

Filed Mar. 26, 1990, Ser. No. 498,400
Int. Cl.[5] A41B *1/08*
U.S. Cl. 2—125 1 Claim

1. A sports garment comprising:
a sleeve adapted to insertably receive an arm of the user;
said sleeve having opposite ends separated by a substantially tubular midsection;
a shoulder portion integrally attached to one end of said sleeve and a cuff carried on the other end of said sleeve;
said sleeve having a pair of inner pockets located adjacent to the elbow and shoulder of the user, said packets attached to an inner surface of said sleeve;
a therapeutic pack insertably disposed in each of said sleeve inner pockets;
means detachably carried on said shoulder portion for releasably securing said sleeve to the body torso of the user;
said detachable means includes a set of straps secured at one end to said shoulder portion, closure means on their opposite ends for releasable connection with said shoulder portion;
said closure means comprises a hook and pile fastener;
a body portion integrally formed with said shoulder portion and downwardly depending therefrom to establish front and rear sections encircling the user's torso;
said straps comprising a shoulder strap and a chest strap cooperating to retain said sleeve in position on the user's arm;
said sleeve, shoulder portion and body front and rear sections are composed of an insulation material;
said front and rear sections include edge marginal regions;
one end of said straps is secured to said back section edge material region while said other ends of said straps are releasably connected to said front section edge marginal region;
said sleeve and said shoulder portion are detachably connected to a similar sleeve and shoulder portion to provide either a full jacket garment or a half jacket.

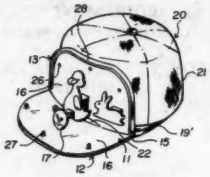
4,985,935

CAP VISOR CONTAINING DISPLAY MEANS

Kyoung M. Hur, 1234 Lexington Ave., New York, N.Y. 10028

Continuation-in-part of Ser. No. 286,085, Dec. 19, 1988. This application Jan. 19, 1990, Ser. No. 467,373
Int. Cl.[5] A42B *1/00*
U.S. Cl. 2—209.1 19 Claims

1. A cap visor containing display means, which is adapted to be attached to a cap to be worn by a person, which comprises:
a lower visor member and a foldable upper visor member, said foldable upper and lower visor member being connected to each other in the area where the cap visor is attached to the cap, said foldable upper visor member being foldable along a weakened area which enables the foldable upper visor member to be separated from the lower visor member to an open position, said foldable upper visor member being provided with a peripheral lip, and said lower visor member being slightly smaller than the foldable upper visor member so that when the lower and the foldable upper visor members are closed on each other, the lower visor member nestles within the foldable upper visor member behind the peripheral lip,



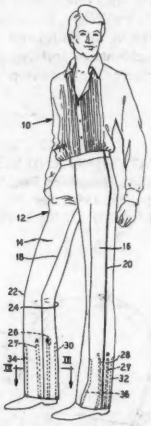
means for holding the foldable upper visor member in its open position, and
display means located between said lower visor member and said foldable upper visor member whereby when the foldable upper visor member is separated from the lower visor member, said display means becomes visible.

4,985,936

ADJUSTMENT FOR GARMENT

William K. Jones, 3218 Timberview Rd., Roanoke, Va. 24019

Filed Jun. 12, 1989, Ser. No. 365,837
Int. Cl.[5] A41D *27/00*
U.S. Cl. 2—269 5 Claims



1. An adjuster system for use in combination with a trouser-like garment having a pair of legs, each leg having an inseam, an outseam, a front crease and a back crease for the adjustment of the length of each leg wherein the improvement comprises: there being provided a plurality of adjuster system, each system secured to the inner surface of a leg and having a strip-like shape for hook-and-loop securement and release said strip having a substantially continuous, elongated fabric section of the loop-type and a tab at a bottom end thereof of a hook-type fabric for cooperation with the loop-type fabric for the hook-and-loop securement, whereby said tab can be releasably secured to the elongated section for substantially continuous adjustment, each of said adjuster systems oriented generally parallel to the length of the leg and affixed adjacent the bottom end thereof, with the hook-type tab adjacent the bottom end and between the bottom end and the loop-type fabric section with an adjuster system adjacent each of said inseam, outseam,

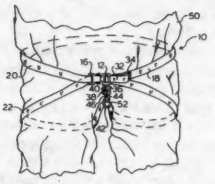
front crease and back crease, whereby the length of the trouser leg can be selectively and continuously adjusted by causing the hood-type tab to engage the loop fabric along the length thereof for stitch-free length adjustment and ready and imperceptible cleaning.

4,985,937

BELT ASSEMBLY FOR SIZINGLY ADJUSTING THE CROTCH REGION OF A GARMENT

William A. Blackburn, Chapel Hill, N.C., assignor to Abandaco, Inc., Manhasset, N.Y.

Filed Jun. 9, 1989, Ser. No. 364,847
Int. Cl.[5] A41F *9/00*
U.S. Cl. 2—312 **12 Claims**



1. A belt assembly for adjusting fit of a garment in the crotch region thereof, said belt assembly comprising:

(a) a first buckle closure member;

(b) a second buckle closure member matably lockable to said first buckle closure member;

(c) an elongate belt secured to said first and second buckle closure members so as to form a first loop portion and a second loop portion therebetween, said belt being constructed and arranged so that upon matably locking said first and second buckle closure members to one another at the waist of a wearer, the first loop portion encircles the waist of the wearer and the second loop portion encircles the lower posterior abdomen of the wearer below the first loop portion and reentrantly passes forwardly between the legs and frontally upwardly to a frontal proximal extremity in proximity to the matably locked buckle closure members;

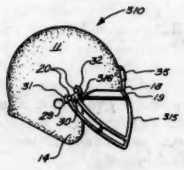
(d) means for fixably securing said frontal proximal extremity in proximity to said matably locked first and second buckle closure members.

4,985,938

QUICK RELEASE FACE MASK FOR USE WITH CONTACT SPORTS HELMETS

Paul D. Snow, Jr., 407 Crestview, Clinton, Miss. 39056

Continuation of Ser. No. 71,419, Jul. 9, 1987, Pat. No. 4,885,807, which is a continuation-in-part of Ser. No. 900,184, Nov. 3, 1986, abandoned. This application Apr. 7, 1989, Ser. No. 334,896
Int. Cl.[5] A42B *3/02*
U.S. Cl. 2—424 **14 Claims**



1. A face mask release apparatus for a rounded contact sport helmet having an outer surface and a forehead and left and right temple areas comprising:

a. a face mask having three attachment portions including left and right side attachments adapted for placement at the left and right temple areas of the helmet and a central upper attachment generally between the left and right side attachments and adapted for attachment to the center forehead area of the helmet;

b. a plurality of posts positioned on each side of the helmet in the temple area, each post having a central axis extending away from the helmet outer surface, the plurality including a first pair of closely spaced posts placed on the left side of the helmet and a corresponding pair of closely spaced posts on the right side of the helmet;

c. a grooved area formed around each post defining a narrowed diameter section of each post generally between its end portions;

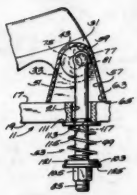
d. means carried by the face mask for forming a quick release connection of the face mask to the helmet at the posts which allows removal of the mask from the posts responsive to application of force to the mask, as during contact sports, from one or more directions including at least force which moves the mask end portion laterally away from a post in a direction away from the helmet and generally along the central axis of the post, and force applied in a direction which moves the mask in a direction away from the post in a direction along the helmet and at an angle to the post, said means including a pair of opposed curved portions on the left and on the right side of the mask that wrap around each post respectively on generally opposite sides of the pair of posts, the curved portions of the mask being correspondingly shaped to register on the grooves defining a frictional fit between the mask and posts at the grooves and on each side of the helmet.

4,985,939

TOILET SEAT HINGE ASSEMBLY

Timothy J. Otte, Sheboygan Falls, Wis., assignor to Bemis Manufacturing Company, Sheboygan Falls, Wis.

Filed Jul. 31, 1989, Ser. No. 387,629
Int. Cl.[5] A47K *13/10*
U.S. Cl. 4—240 **11 Claims**



5. A self rising toilet seat assembly comprising a toilet seat having a rearward portion, a toilet bowl having an upper surface, a lower surface, and an opening extending between said surfaces, and a hinge assembly comprising a housing engaging said upper surface of said toilet bowl and comprising an internal cavity including a bottom opening, and a cylindrical bearing surface having a horizontally extending axis, a hinge member including a cylindrical portion supported by said bearing surface for rotation about said axis, a hinge pin extending co-axially with said cylindrical portion and outwardly of said housing, and fixedly engaged with said rearward portion of said toilet seat to effect toilet seat rotation in common with rotation of said hinge member about said axis, and an operating pin extending in said cavity and located in eccentric relation to said axis, an elongated actuating link extending through said opening in said toilet bowl and into said cavity in said housing through said bottom opening and including a lower stud portion having a lower threaded part, and an upper end operably connected to said operating pin to cause rotation of said hinge

member in response to link movement in the direction of link elongation, and means for biasing said link downwardly and for retaining said housing in tight engagement on said upper surface of said toilet bowl and comprising a locating washer having an upper face engaging said lower surface of said toilet bowl, a boss extending from said upper face and loosely received in said opening in said toilet bowl, a lower face, and a central aperture through which said stud portion extends, a cupped washer located in spaced relation to said locating washer and including a lower surface, an upper surface having therein a recess, and a central aperture through which said stud portion extends, a helical spring located in encircling relation to said stud portion, and between, and in engagement with, said lower surface of said locating washer and said recess in said lower washer, and a nut adjustably threaded on said threaded lower part of said stud portion and in engagement with said lower surface of said lower washer to adjustably compress said spring so as to yieldably locate said toilet seat in a vertical position and effect tight engagement of said housing on said upper surface of said toilet bowl.

4,985,940

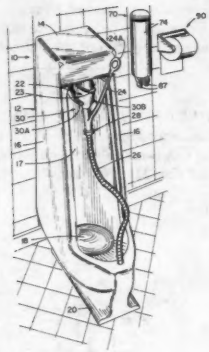
URINAL FOR USE BY FEMALE INDIVIDUALS

Kathie K. Jones, 5764 Red Cedar St., Pensacola, Fla. 32507

Filed Nov. 17, 1989, Ser. No. 439,068

Int. Cl.[5] E03D *13/00*; A47K *11/00*

U.S. Cl. 4—301 **20 Claims**



1. A plumbing fixture for use primarily in public restrooms, comprising:

a substantially vertical back wall, a pair of substantially vertical side walls integral to opposite edges of said back wall, said side walls projecting forwarding from said back wall in substantial parallelism to one another, a substantially horizontal top wall disposed in surmounting relation to said side walls and said back wall and being integral with said side and back walls, a water-retaining bowl means integral to respective lower ends of said back and side walls, and said fixture having an open front;

said bowl means, back wall, side walls and top wall collectively forming a cavity;

a first fluid passageway means being formed in said top wall;

said first fluid passageway means being disposed in fluid communication to a preexisting water line that provides flushing water to toilet fixtures;

a second fluid passageway means being formed in said bowl means;

said second fluid passageway means having a configuration that enables a siphoning action flush of said fixture in response to opening said water line;

said second fluid passageway means being in fluid communication to a preexisting sewer line; and

said fixture being floor-mounted and said bowl means being positioned in closely spaced relation to a floor;

a funnel member having a rim and a downspout;

an elongate flexible hose having a lowermost end in open fluid communication with said bowl means, above the plane of water in said bowl, and an uppermost end in open fluid communication with said downspout;

a hanger means for supporting said funnel member when not in use;

said hanger means being mounted to said back wall;

said top well being disposed in overhanging relation to said funnel member when said funnel member is supported by said hanger means;

said funnel member being wholly positioned within said cavity when so supported;

an elongate handle means having a first end integral with said funnel downspout and a second end adapted to be grasped by a human hand;

said handle means having a predetermined length sufficient to position said second end thereof external to said cavity so that a riser of said fixture need not reach into said cavity to remove said funnel member from its support;

said hanger means including a pair of transversely spaced apart arm members, said arm members being spaced from one another by a predetermined distance that is slightly less than a predetermined width of said funnel member so that said funnel member is suspendedly supported by said arm members when disposed therebetween;

a disposable funnel-lining means adapted to overlie the rim of said funnel member so that only said funnel-lining means contacts the body of the individual employing said fixture; and

removal means for ejecting said funnel-lining means from said funnel member when said funnel member is re-hung on said hanger means after use.

4,985,941

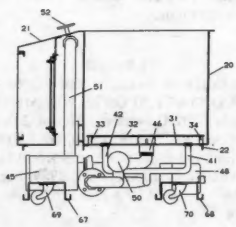
HYDROTHERAPY MACHINE

Bruce Pommerening, Holland, Mich., assignor to Evans Hydrotherapy Corp., Holland, Mich.

Filed Dec. 23, 1988, Ser. No. 289,964

Int. Cl.[5] A61H *33/02*

U.S. Cl. 4—495 **7 Claims**



1. A hydrotherapy machine including a tank having a bottom and side wall means, and means operative to circulate liquid within said tank, wherein the improvement comprises:

a floor panel mounted within said tank in a substantially horizontal position spaced above the bottom of said tank, and extending laterally to within close proximity to said sidewall means to form a gap between the periphery of said floor panel and side wall means, said floor panel having a central opening;

first conduit means, communicating with said circulating means from below said floor panel and the space between said tank bottom and floor panel; and

second conduit means, said second conduit means communicating with said circulating means from below said floor panel and the space within said tank above said floor panel

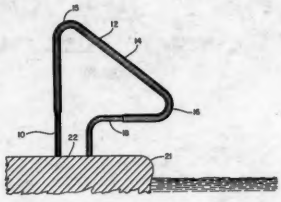
directly through said central opening, said circulating means thereby inducing a toroidal circulation within said tank.

4,985,942

HANDRAIL SLEEVE

Tony G. Shaw, 6620 Bubbling Brook Dr., #B, Las Vegas, Nev. 89107

Filed Jun. 16, 1989, Ser. No. 367,456
Int. Cl.[5] E04H *03/16*; E06C *01/36*
U.S. Cl. 4—496 **7 Claims**



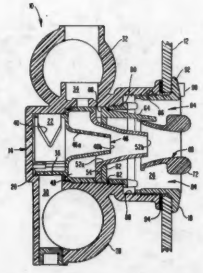
1. A swimming pool or spa handrail assembly comprising:
(a) tubular handrail having a curved portion along the length thereof,
(b) a removable sleeve secured entirely around(the exterior surface of said handrail along at least part of said curved portion; and
(c) said sleeve comprising a laminated construction of an elongated, substantially rectangular sheet of synthetic elastomer disposed adjacent the exterior surface of the handrail and a sheet of fabric bonded substantially entirely to one surface of the elastomer sheet, said fabric sheet being the outer surface of the sleeve which is exposed to the user when the handrail is grasped and releasable securing means extending substantially along the entire length of the opposite edges of said elongated sheet for joining said opposite edges to secure said sleeve around and along said tubular handrail.

4,985,943

TWO-STAGE ADJUSTABLE HYDROTHERAPEUTIC JET AND METHOD

Samuel Tobias, Edison, and Robert M. Messinger, Cranford, both of N.J., assignors to Hayward Industries, Inc., Elizabeth, N.J.

Filed Sep. 8, 1989, Ser. No. 404,684
Int. Cl.[5] A61H *33/00*
U.S. Cl. 4—542 **39 Claims**



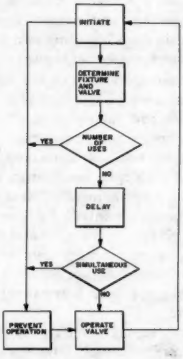
1. In a hydrotherapeutic jet adapted to be mounted to the wall of a hydrotherapeutic receptacle, including an entrainment chamber located internally of said jet, first inlet means for providing communication between the entrainment chamber and a source of pressurized water, second inlet means for providing communication between the entrainment chamber and the hydrotherapeutic receptacle, the first inlet means including accelerating means for increasing the velocity of water being discharged into the entrainment chamber from the first inlet means to thereby create a low pressure condition within the entrainment chamber, the low pressure condition being sufficient to suck water into the entrainment chamber through the second inlet means, and discharging means for discharging water contained in the entrainment chamber into the receptacle, the improvement comprising an aeration chamber located internally of said jet and communicating between the source of pressurized water and the accelerating means; air supply means for providing a supply of air to said aeration chamber, whereby pressurized water can be mixed with an air within said aeration chamber and the resulting air/water mixture can then be supplied from the aeration chamber to the entrainment chamber through the accelerating means; and another accelerating means for increasing the velocity of water discharged into said aeration chamber, thereby creating a low pressure condition within said aeration chamber which sucks air supplied by said air supply means into said aeration chamber.

4,985,944

PLUMBING CONTROL SYSTEM AND METHOD FOR PRISONS

Daniel C. Shaw, Geneva, Fla., assignor to Bauer Industries Inc., Orlando, Fla.

Filed Jul. 20, 1989, Ser. No. 382,113
Int. Cl.[5] A47K *4/00*
U.S. Cl. 4—664 **22 Claims**



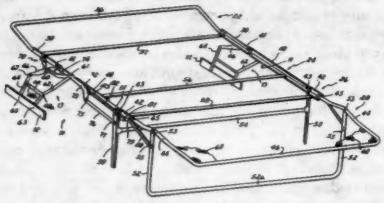
14. A control system for a prison plumbing system, comprising:
(a) a plurality of spaced fixtures;
(b) a source of water;
(c) a first plurality of flow regulating means, each of said flow regulating means interposed between one of said fixtures and said source;
(d) a first plurality of capacitance sensors, each sensor positioned proximate one of said fixtures and operable to request operation of the associated fixture; and,
(e) control means operably associated with each of said flow regulating means and with said capacitance sensors for causing operation of a flow regulating means upon the expiration of at least a predetermined period subsequent to operation of the associated sensor and for limiting the number of operations of each flow regulating means per unit time.

4,985,945

DOUBLE-LOCK SOFA SLEEPER MECHANISM

Danny C. Robinson, Carthage, Mo., assignor to Leggett & Platt, Incorporated, Carthage, Mo.

Filed Mar. 21, 1989, Ser. No. 326,369
Int. Cl.[5] A47C 17/04
U.S. Cl. 5—13 5 Claims



1. A foldable sofa sleeper mechanism adapted to be mounted upon a sofa frame and stored within a storage enclosure of the sofa frame, said mechanism comprising

a bed frame having pivotally interconnected head, body, intermediate and foot sections each having a pair of opposed side rails, a mattress supporting fabric extending between said sections and connected thereto,

linkage mechanism for supporting said bed frame from the sofa frame, said linkage mechanism comprising a pair of center legs connected to a center leg actuating means including a bed lock plate operable to retract and extend said center legs, said linkage means further comprising a pair of front legs pivotally connected to said foot section of said bed frame and interconnected by a transverse leg brace, said sofa sleeper mechanism being movable between a folded position in which said bed frame and said linkage mechanism is contained within said storage enclosure of said sofa frame and said center legs and front legs are retracted, and an extended unfolded position in which said bed frame extends forwardly from said sofa frame and said center legs and front legs extend downwardly from said bed frame,

front leg actuating means including a single leg lock link and a single compression lock link extending between and interconnecting said bed lock plate and one of said front legs, said compression lock link being pivotally connected at one end to said bed lock plate and at the other end to one end of said leg lock link, an opposite end of said leg lock link being pivotally connected to said one of said front legs, and said leg lock link being pivotally connected intermediate its ends to said intermediate section of said bed frame,

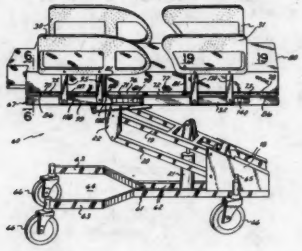
said front leg actuating means being operable when said sofa sleeper mechanism is moved to a folded position to lock said foot section relative to said intermediate section in a position in which the foot section overlies and is generally parallel to said body section of said bed frame, and then to subsequently move said intermediate section of said bed frame relative to said body section upon movement of said compression lock link as said folded sofa sleeper mechanism is moved into said storage enclosure of said sofa frame.

4,985,946

HOSPITAL BED ADAPTED FOR USE WITH A C-ARM

L. Dale Foster, Brookville, and David W. Hornbach, Guilford, both of Ind., assignors to Hill-Rom Company, Inc., Batesville, Ind.

Filed Jul. 28, 1989, Ser. No. 386,210
Int. Cl.[5] A61G 7/00; A47C 21/08
U.S. Cl. 5—60 12 Claims



1. A hospital bed comprising:

a base,

a bed frame mounted above said base, said bed frame having a translucent section at its head end,

a head guard mounted on said bed frame alongside said translucent section of said bed,

linkage means connecting said head guard to said frame to permit said head guard to be moved away from said translucent section, thereby permitting a C-arm to be moved against said bed frame adjacent said translucent section free from obstruction by the head guard,

said linkage means comprising:

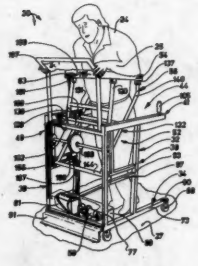
a parallelogram linkage including two spaced parallel links connected to said head guard and pivotal about vertical axes to permit said head guard to shift from a first position wherein said links extend toward the head of the bed through 180° to a position wherein said links extend toward the foot end of the bed.

4,985,947

PATIENT ASSIST DEVICE

Kenneth L. Ethridge, Rte. 1, Box 139, Bee Branch, Ark. 72013

Filed May 14, 1990, Ser. No. 522,670
Int. Cl.[5] A61G 7/14, 7/10
U.S. Cl. 5—81 R 14 Claims



1. A mobile machine for assisting a partially ambulatory user to walk or move about, said machine comprising:

frame means, comprising front and rear means, adapted to be disposed upon a supporting surface;

yoke means associated with said frame means for selectively engaging the torso of said user;

linkage means for dynamically coupling said yoke means to said frame means, said linkage means comprising top lever means for coupling said yoke means to a first pivot point defined upon said frame means; bottom lever means for coupling said yoke means to a second pivot point defined upon said frame means, said first pivot point being located above said second pivot point and being offset from said second pivot point towards said frame front means, and the length of said top lever means being less than the length of said bottom lever means; and,

motor means disposed upon said frame means for selectively moving said yoke means and consequently said user from a sitting position to a standing position.

4,985,948

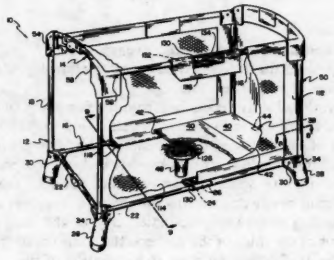
FOLDABLE PLAYYARD

John V. Mariol, Cincinnati, Ohio, assignor to Spalding & Evenflo Companies, Inc., Tampa, Fla.

Continuation-in-part of Ser. No. 266,619, Nov. 3, 1988, Pat. No. 4,934,025. This application Sep. 8, 1989, Ser. No. 404,937

Int. Cl.[5] A47D *7/00*

U.S. Cl. 5—99.1 **9 Claims**



1. A foldable playyard for safe occupation by a child comprising in combination:

an essentially rectangular upper support formed of four pair of rods each centrally coupled by a hinge;

an essentially rectangular lower support formed of four pair of rods each centrally coupled by a hinge;

four vertical rails interconnecting the corners of the upper and lower supports to retain the upper and lower supports in a box-like configuration with the rods of the upper and lower supports pivotally coupled to the vertical rails to allow for pivoting the rods of the upper support and lower support between horizontal orientations when the playyard is in an unfolded condition for operation and use and vertical orientations when the playyard is in a folded condition for storage; and

a unitive fabric assembly comprising four vertically disposed panels each coupled between a pair of rods of the upper support and lower support and adjacent vertical tubes, the fabric assembly also including a lower horizontal panel stitched to the vertically disposed panels and coupled between the rods of the lower rectangular support.

4,985,949

INFANT CARRIER SEAT ROCKER

Robert F. Jantz, 9 Maverick Clr., Pomona, Calif. 91766

Filed Sep. 1, 1989, Ser. No. 402,468

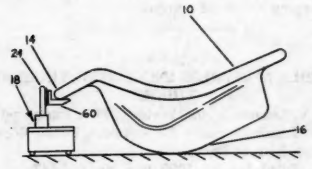
Int. Cl.[5] A47D *9/02*

U.S. Cl. 5—109 **3 Claims**

1. An improved rocking device for a typical infant carrier seat having a convexly curved bottom upon which said seat naturally rests to facilitate a fore and aft rocking motion and a pair of opposed identical side walls and outwardly curved external lips formed at the uppermost edge of the head and foot ends of said seat; said rocking device rests on a common plane with said seat and comprises:

a vertical lifter yoke for vertical oscillatory motion,

a lifter tray removably receiving one of said external lips of said seat and is adjustably attached to said lifter yoke by a hook and loop type fastener, thereby providing for a plurality of attachment positions of said lifter tray relative to said lifter yoke,



a drive means for oscillating said lifter yoke, said drive means including a motor with an output shaft and a drive pin eccentrically connected to said shaft, said pin being free to slidably move through a horizontally oriented slot in said lifter yoke thereby producing said vertical oscillating motion in said lifter yoke,

a housing surrounding said drive means and part of said lifter yolk so that the part of said lifter yolk not within said housing is exposed to receive said lifter tray.

4,985,950

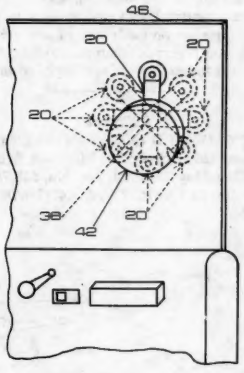
DETACHABLE HANGING HEADREST/PILLOW

William C. Gladish, 3506 Latana Way, Beale AFB, Calif. 95903

Filed Apr. 19, 1990, Ser. No. 511,331

Int. Cl.[5] A47C *20/00*

U.S. Cl. 5—437 **10 Claims**



1. An article of comfort for a human, comprising:

(a) a surface attachment device to support the weight of said article of comfort and its use by a human leaning on it for comfort;

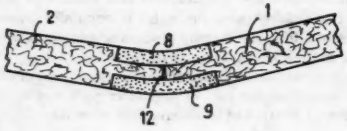
(b) an attachment strip having first and second ends;

(c) a cushioning material to accommodate the comfort of a human;

(d) a protective covering, comfortable to a human, surrounding within a perimeter edge said cushioning material;

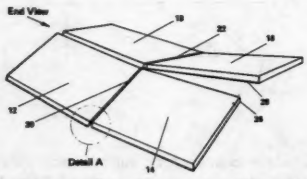
(e) a securing means for joining said protective covering over said cushioning material;
(f) a connecting means for joining said surface attachment device to said attachment strip first end;
(g) detaching and attaching means for joining said attachment strip second end to proximate said perimeter edge of said protective covering allowing various separation and reconnection positions, whereby a human can hang said article of comfort onto various surfaces and locations for leaning onto and conveniently disconnect from said attachment strip and use as a convenient and comfortable nonhanging article of comfort.

4,985,951
FLEXIBLE MATTRESS INCLUDING VEGETABLE FIBERS
Phillipe G. V. Lacotte, 3, rue Montéra, 75012 Paris, and Norbert Smil, La Grande Bastide - La Rouvière, 83520 Roquebrune-sur-Argens, both of France
Filed Jan. 11, 1990, Ser. No. 463,517
Claims priority, application France, Jan. 11, 1989, 89 00285
Int. Cl.[5] A47C *27/22*
U.S. Cl. 5—465 **13 Claims**



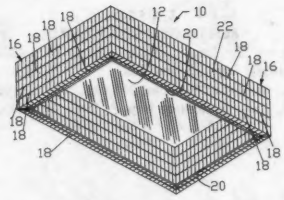
1. Mattress comprising:
at least one layer of material comprising vegetable fibers and which has an upper face and a lower face and is constituted by at least two blocks being in substantially adjacent relation and defining a junction zone between said blocks located substantially in a transverse plane of the mattress, said junction zone between said blocks being disposed along a fold line of the mattress, and
layers of foam material disposed at least in the vicinity of said junction zone on each side of said transverse plane, respective said layers of foam material being fixed to said face and said lower face of said layer of material.

4,985,952
FLEXIBLY HINGED CONVERTIBLE MATTRESS
Nathan Edelson, 526 Hickory St., Missoula, Mont. 59801
Filed May 23, 1990, Ser. No. 528,705
Int. Cl.[5] A47C *27/14*; A47G *9/06*
U.S. Cl. 5—465 **4 Claims**



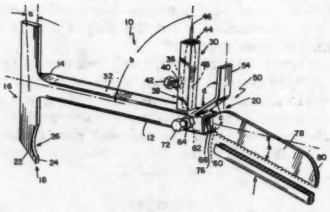
1. A flexibly hinged convertible mattress or other device comprising four approximately rectangular sections of approximately uniform dimensions wherein said first section is flexibly connected to said second section, and said third section is flexibly connected to said fourth section, said flexible connections being made along one like-length top edge of each said section; and also wherein said second section is flexibly connected to said third section, said connection being made along one like-length bottom edge of each of said second and third sections, said flexibly-connected bottom edges being at right angles to said flexibly-connected top-edges, whereby said mattress or other device may be easily and variously folded and unfolded to permit diverse uses and compact storage.

4,985,953
FITTED MATTRESS COVER
Michael E. Seago, Louisville, Ky., assignor to Louisville Bedding Co., Louisville, Ky.
Filed Feb. 21, 1990, Ser. No. 482,515
Int. Cl.[5] A47G *9/00*
U.S. Cl. 5—497 **6 Claims**



1. A fitted mattress cover comprising:
a. a top panel for fitting in overlaying relationship to the top surface of a mattress; and,
b. a peripheral skirt depending from the periphery of the top panel for fitting in overlaying relationship to the sides and ends of the mattress, the depending skirt comprising:
a gathered single layer of relatively inelastic material; and,
a plurality of spaced apart, parallel rows of elongated elastic cords attached to the inelastic material and extending generally perpendicularly to the longitudinal axis of the folds of the gathers, the elastic cords being in a relaxed condition prior to installation of the cover on the mattress and stretchable in the direction of their longitudinal axis when the cover is installed on the mattress.

4,985,954
GLASS SAW
Thomas L. Wehr, R.R. #3, Box 232, Fairland, Ind. 46126
Filed Nov. 2, 1989, Ser. No. 430,427
Int. Cl.[5] B25F *3/00*; B26B *3/00*; B26F *1/00*
U.S. Cl. 7—144 **13 Claims**



1. A glass saw comprising an elongated body portion having a forward end and a rearward end, a rear handle attached to the rearward end and extending generally transversely in at least a first direction from the body portion, a forward handle extending generally transversely from the body portion intermediate the forward and rearward ends thereof, and a blade having an end portion situated inside the forward end of the

body portion, and means for removably attaching the end portion of the blade to the forward end of the body portion.

4,985,955

PROCESS FOR DYEING KERATINOUS FIBRES WITH COUPLERS AND/OR "RAPID" OXIDATION DYES COMBINED WITH AN IODIDE AND DYEING COMPOSITION EMPLOYED

Jean F. Grollier, Paris; Jean Cotteret, Verneuil-sur-Seine, and Didier Garoche, Levallois-Perret, all of France, assignors to L'Oreal, Paris, France

Filed May 25, 1988, Ser. No. 198,806
Claims priority, application Luxembourg, May 25, 1987, 86.899
Int. Cl.[5] A61K 7/13
U.S. Cl. 8—406 25 Claims

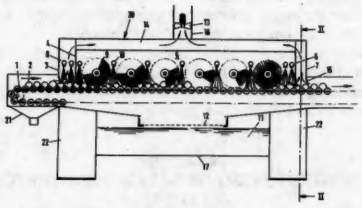
1. A process for dyeing keratinous fibers comprising applying to said fibers at least one composition (A) comprising, in a medium suitable for dyeing said fibers, an oxidation dye, wherein said oxidation dye consists of, at least one coupler selected from the group consisting of a phenol, a metadiphenol, a meta-aminophenol, a meta-phenylenediamine, a monohydroxylated derivative of naphthalene, a polyhydroxylated derivative of naphthalene, a monohydroxylated derivative of aminonaphthalene, a polyhydroxylated derivative of aminonaphthalene, a pyrazolone and benzomorpholine, said coupler being present in an amount ranging from 0.01 to 10 percent by weight based on the total weight of said composition (A), in combination with iodide ions present in an amount ranging from 0.007 to 4 percent by weight, expressed as I^- ions, relative to the total weight of said composition (A), and applying to said fibers composition (B) comprising, in a medium suitable for dyeing said fibers, hydrogen peroxide having a pH ranging from 2 to 12, the application of said composition (A) to said fibers preceding or following the application of said composition (B) to said fibers.

4,985,956

WASHING MACHINE VAPOR EXHAUST

Jelle van der Schoot, Aalten, Netherlands, assignor to Staalkat B.V., Aalten, Netherlands

Filed Jun. 19, 1989, Ser. No. 367,804
Int. Cl.[5] A01K 43/00
U.S. Cl. 15—3.13 9 Claims



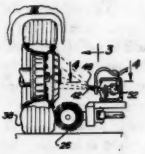
1. In an apparatus for cleaning eggs and the like having a housing with an input end and an output end, a conveyor means disposed from the said input end to the said output end for conveying the eggs laterally through said housing, one or more brushing means disposed above said conveyor means for brushing the eggs disposed on said conveyor means, one or more liquid spraying means disposed within said housing for spraying a cleaning liquid on the eggs disposed on said conveyor means, and liquid collection means disposed under said conveyor means for collecting said cleaning liquid which passes through said conveyor means, the improvement comprising sub-atmospheric pressure exhaust means disposed near the said input end and said output end for exhausting vapors of the cleaning liquid from the housing, whereby said vapors are substantially prevented from escaping from the housing into the atmosphere around the housing, said exhaust means being formed by an outside wall and an adjacent inside wall of the housing at the said input end and at the said output end, whereby double walls having cavities therebetween are formed and said cavities are maintained at said sub-atmospheric pressure.

4,985,957

WHEEL WASHING APPARATUS AND METHOD

Michael J. Belanger, Walled Lake, and Graham J. Astley, Novi, both of Mich., assignors to Belanger, Inc., Northville, Mich.

Filed Jan. 12, 1990, Ser. No. 464,338
Int. Cl.[5] B60S 3/06
U.S. Cl. 15—53.3 17 Claims



1. A wheel washing apparatus for use in a drive-through vehicle washing system in which a vehicle is moved along a longitudinal path across a floor at a predetermined speed by a conveyor to pass by a series of washing stations including a tire wash station of the type utilizing a parallelogram linkage for orienting an elongated brush carried by an elongated longitudinal beam adjacent the tire of a vehicle having an unknown width, said wheel washing apparatus comprising:

a manifold having a fluid inlet coupled to a source of pressurized liquid and an outlet nozzle in communication therewith for directing a stream of liquid at the vehicle wheel;

a flow control valve for regulating the supply of pressurized liquid to the manifold inlet;

drive means for mounting the manifold upon the tire washer longitudinal beam to translate the manifold longitudinally to follow a vehicle wheel passing thereby for a distance sufficient for the stream of liquid to clean the entire circumference of the wheel;

sensor means for sensing the approach of a wheel; and

control means for controlling the drive means and the flow control valve in response to the sensor means to initiate liquid flow and to move the manifold at a speed substantially equal but independent of the vehicle speed to maintain the manifold generally adjacent the wheel for a wash cycle, and to terminate the flow of liquid and to cause the drive means to retract the first manifold at the end of the wash cycle.

4,985,958

ROLLER TYPE APPLICATOR FOR PAINT

Ricardo Garcia, 5849 NW. 7th St., Apt. #503, Miami, Fla. 33126

Filed Aug. 25, 1989, Ser. No. 398,546
Int. Cl.[5] B05C 17/02
U.S. Cl. 15—114 2 Claims

1. An applicator assembly designed to apply paint to a surface and junction of two intersecting surfaces, said assembly comprising:

a. a housing having an angled front face, rear face, and two interconnecting end walls disposed in surrounding relation to an open interior wherein the peripheral edges of such walls define an open mouth accessible to said open interior, said angled front face having a distal end surface,

b. an applicator roll rotatably mounted within said housing

and disposed to have a portion thereof projecting outwardly from the open interior through said open mouth,

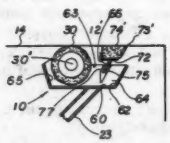
c. a secondary applicator element including mounting means, said mounting means being within said housing and said secondary applicator element being in spaced relation to said applicator roll and extending outwardly from said open interior through said open mouth,

d. said secondary applicator comprising an elongated configuration having a leading face, said leading face being disposed in space, substantially parallel relation to the front face of said housing but in outwardly spaced relation thereto,

e. said secondary applicator including an elongated brush disposed and configured to provide paint distribution at a junction of the intersecting surfaces being painted, said brush having a front face;

f. said angled front face of said housing disposed in cooperative relation to a front face of said brush so as to define a return path of fluid flow of paint along said front face of said brush and between said brush front face and the front face of said housing, said brush front face being generally parallel to the housing front face,

g. both said front face of said brush and said front face of said housing being oriented at an angle of less than 90° relative to the surface being painted when in an operative position and said front face of said brush and housing being angularly oriented in a direction towards the roll in said housing,



i. said applicator roll and said housing to direct paint flow along said return path of fluid flow onto said applicator roll,

j. said brush being removably mounted within said housing assembly and includes a mounting base extending substantially along the base length and along the length of said housing assembly, said mounting base including at least one exposed surface disposed at least partially within said housing and defining a portion of said return path of fluid flow, whereby excess paint applied to said surface being painted is at least partially returned to said applicator assembly along said return path of fluid flow,

k. said mounting base comprising an elongated, linearly configured flange having a longitudinal dimension sufficient to have opposite ends thereof removably engage opposite end walls of said housing, attachment means secured to interior surfaces of opposite end walls of said housing and structured for supporting engagement of correspondingly positioned opposite ends of said flange, and

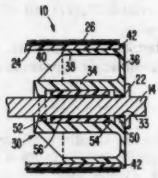
l. said attachment means comprising two brackets each securely fastened to an inner surface of a different one of said opposite end walls of said housing and each bracket including an open ended channel dimensioned to receive a corresponding end of said flange therein, in retaining engagement therewith.

4,985,959

END SUPPORTS FOR PAINT ROLLER ASSEMBLY

Harry A. Lieberman, Haverford, Pa., and Kenneth R. Stoddart, Fond du Lac, Wis., assignors to RAF Industries, Inc., Elkins Park, Pa.

Filed Mar. 10, 1987, Ser. No. 24,142
Int. Cl.[5] B05C *17/02*
U.S. Cl. 15—230.11 **9 Claims**



9. A paint roller assembly comprising the combination of:

(a) a handle member having an axle;

(b) a paint-applying cover sleeve adapted to rotate about the axis of the axle of the handle member, and

(c) end support members adapted to be tightly frictionally mounted at each end of said paint-applying cover sleeve and adapted to receive said axle of said handle member, each end support member comprising:

(1') a flat outer end wall;

(2') a longitudinally extending central hub having at least one end opening, said opening being formed by a radially inwardly directed annular shoulder having a diameter slightly greater than the diameter of an axle of a handle member; said shoulder, the inner surface of said hub, and all or a part of said end wall defining a chamber which is substantially greater in diameter than the diameter of an axle of a handle member;

(3') an outer annular flange carried by said end wall and adapted to tightly frictionally engage the inner surface of a cover sleeve, and

(4') a radially expansible split tube positioned in said chamber and longitudinally limited in movement by said shoulder and by all or part of said end wall, the interior diameter of said split tube prior to expansion being smaller than the diameter of an axle of a handle member, and the outer diameter of said split tube being smaller than the inner diameter of said chamber,

whereby insertion of the axle into the longitudinally confined split tube results in radially inward pressure being applied by said tube to the axle to frictionally retain the same in its longitudinal position.

4,985,960

CASTER WITH LEVER FOR BRAKING AND DIRECTION SETTING

Hong-Fu Zan, No. 59, Alley 85, Lane 673, Chung Chen Road, Yi-Chia Village, Jen Te Hsiang, Tainan Hsien, Taiwan

Filed Mar. 6, 1990, Ser. No. 489,097
Int. Cl.[5] B60B *33/00*; B60T *1/00*
U.S. Cl. 16—35 R **1 Claim**

1. A caster-supporting device comprising:

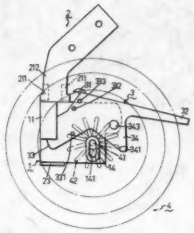
a caster-mounting member adapted for extension of a caster axle therethrough and including a bump provided on a side surface thereof, and two slide slots formed in two sides of said caster-mounting member;

a connector having two parallel side surfaces, a cylindrical lower portion journalled on said caster-mounting member in such a manner that said cylindrical lower portion can rotate about a vertical axis, and a keyway formed in said connector;

a spoke member adapted to connect securely to center of a

caster and including a plurality of spokes extending radially from said center of said caster; and

a control body, mounted pivotally on said caster-mounting member in such a manner that said control body can rotate about a horizontal axis, including a first positioning hole, a second positioning hole normally engaged with said bump of said caster-mounting member, so as to position said control body relative to said caster-mounting member, a third positioning hole, a push lever secured to said control body, a horizontal gripping rod extending outwardly from a side surface of said control body, a key provided on said control body and normally spaced apart from said keyway of said connector, and two parallel clamping plates secured to said control body and received respectively and slidably within said slide slots of said caster-mounting member at front ends of said clamping plates, said clamping plates being normally spaced apart from said parallel side surfaces of said connector, said gripping rod being normally spaced apart from said spoke member;



all of said first, second and third positioning holes being formed in an inner surface of said clamping plate, said push lever being capable of being actuated to rotate said control body relative to said caster-mounting member, so as to disengage said bump from said second positioning hole, thereby selectively engaging one of said first and third positioning holes with said bump, engagement of said bump within said first positioning hole locating said gripping rod between an adjacent pair of said spokes and clamping said parallel side surfaces of said connector between said clamping plates, so as to prevent both relative rotation between said connector and said caster-mounting member and rolling of said caster, engagement of said bump within said third positioning hole inserting said key of said control body into said keyway of said connector, so as to prevent rotation of said caster-mounting member relative to said connector while permitting rolling of said caster.

4,985,961

HANDLE AND IMPLEMENT HEAD ASSEMBLY

Boyd F. Kegley, 8402 Catamaran Dr., Indianapolis, Ind. 46236

Filed Oct. 24, 1989, Ser. No. 426,098

Int. Cl.[5] B25G *1/00*

U.S. Cl. 16—111 R **17 Claims**

7. A handle and implement head assembly comprising:

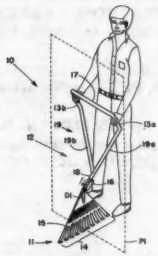
an implement head having a working edge adjacent a substantially planar portion;

a pair of generally longitudinal gripping portions having axes parallel to each other;

a connection member positioning said pair of gripping portions a fixed distance apart on the same side of and substantially equidistant from a central plane perpendicularly intersecting the center of the working edge, with at least one of said gripping portions being outside an implement plane which is coplanar with said substantially planar portion;

wherein the axes of said gripping portions are each oriented at an angle between about 20° and 60° relative to the central plane

wherein said connection member has an upper portion which has first and second upper connection portions and includes a lower connection portion; and



wherein said first upper connection portion is attached to one of said pair of gripping portions at a first end thereof and said second upper connection portion is attached to the other of said pair of gripping portions at a first end thereof.

4,985,962

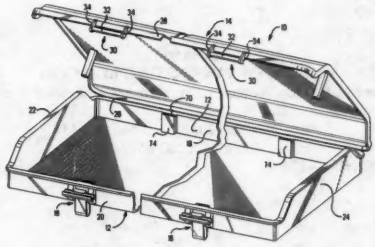
COMBINATION LATCH-HINGE DEVICE

Ronald M. Weber, Lebanon, Pa., assignor to AMP Incorporated, Harrisburg, Pa.

Filed Jul. 10, 1990, Ser. No. 550,603

Int. Cl.[5] E05D *15/50*

U.S. Cl. 16—232 **4 Claims**



1. A device capable of functioning either as a latch or as a hinge for use on enclosures having a housing and a cover so that the cover may be rotatably opened from either of two opposite sides of the housing, said device comprising:

latch sections mounted on two opposite sides of a housing, said sections including first means and cooperating latching means wherein said first means include grooved rails parallel to and spaced outwardly from respective sides by support arms and said latching means include latching members having a leg with a lip thereon which extends over respective said grooved rails, said leg being between said rail and respective said sides and movable theretowards to remove said lip from over said grooved rail; and

hinge sections mounted on two opposite sides of the cover in registration with said latch sections when the cover closes over the housing, said hinge sections having a rod spaced outwardly from and in parallel relation to respective sides

for being received in said grooves and removably retained therein by said latching member.

4,985,963

METHOD AND DEVICE FOR SEPARATING SKELETON PARTS FROM A CARCASS

Lars-Erik Norling, S-262 00 Ängelholm, Valhallavägen 49, Sweden

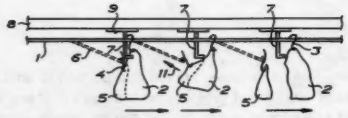
PCT No. PCT/SE88/00207, § 371 Date Oct. 26, 1989, § 102(e) Date Oct. 26, 1989, PCT Pub. No. WO88/08250, PCT Pub. Date Nov. 3, 1988

PCT Filed Apr. 25, 1988, Ser. No. 424,273

Claims priority, application Sweden, Apr. 27, 1987, 8701726

Int. Cl.[5] A22C *15/00*

U.S. Cl. 452—187 6 Claims



1. A method for continuous separation of skeleton parts from a carcass comprising the steps of:

hanging the carcass on a first meat hook provided on an overhead conveyor for transporting the carcass;

attaching a second meat hook to a part of the carcass to be separated, said second meat hook being held on a portion of the conveyor through a support means; and

pressing an arm on the carcass for forcing the carcass in the running direction of the conveyor away from the second meat hook, whereby the part of the carcass is separated from the carcass.

4,985,964

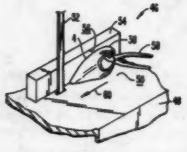
DOG CHEW PROCESSING METHOD

Richard L. Lawson, Sanger, Calif., assignor to Product Carousel Inc., Fresno, Calif.

Filed Nov. 29, 1989, Ser. No. 443,457

Int. Cl.[5] A22C *25/18*

U.S. Cl. 452—135 13 Claims



1. A method for processing a hoof for use as a pet chew, the hoof having a bottom and upper edge, comprising the following steps:

cleaning the hoof;

positioning a saw blade adjacent a backing plate, the saw blade having a thickness;

positioning the bottom of the hoof against the backing plate; and

moving at least one of the saw blade and the hoof towards the other to remove a portion of the bottom of the hoof by the saw blade, the portion having a thickness which is no greater than about the thickness of the saw blade.

4,985,965

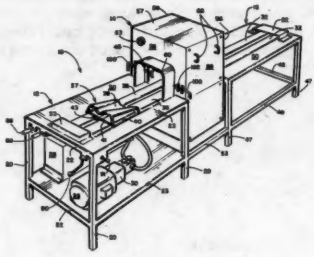
FISH PROCESSING UNIT

Joseph Leavitt, 2003 Bayview Heights Dr., San Diego, Calif. 92106

Filed Jan. 16, 1990, Ser. No. 466,080

Int. Cl.[5] A22C *25/14*

U.S. Cl. 17—61 7 Claims



1. A fish processing unit for longitudinally quartering a fish during a single pass through said unit comprising:

a front table assembly having a front end, a rear end and a top panel, said front table assembly having a longitudinally extending axis;

a rear table assembly having a front end, a rear end and a top panel, aid rear table assembly having a longitudinally extending axis that coincides with the longitudinal axis of said front table assembly;

the front end of said rear table assembly is positioned a predetermined distance from the rear end of said front table assembly, a fish quartering assembly is positioned in this area;

said fish quartering assembly having a front wall having an entry port, a rear wall having an exit port, a pair of vertically oriented circular blades both mounted in the same vertical plane but one spaced above the other a predetermined height H1, a first pair of horizontally oriented circular blades both mounted in the same horizontal plane and having their adjacent edges spaced a predetermined distance from each other and each of them also being on opposite sides of said pair of vertically oriented circular blades;

means for rotating all of said circular blades;

conveyor means for transporting a whole fish from said front table assembly through the entry and exit ports of said fish quartering assembly and then on to said rear table assembly comprising a pair of laterally spaced closed looped belts that are supported on the top panels of said front and rear table assemblies, the belts are oriented so they pass on opposite sides of said vertically oriented blades; and

a pair of longitudinally extending tray guide channels on the top panel of said front table assembly, said tray guide channels being on opposite lateral sides of said conveyor means.

4,985,966

APPARATUS FOR CLEANING A CARD

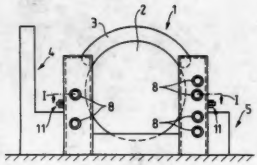
Heinz Nitschke, Winterthur, and Werner Hauschild, Duernten, both of Switzerland, assignors to Rieter Machine Works, Ltd., Winterthur, Switzerland

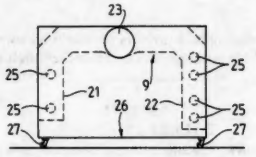
Filed Apr. 20, 1989, Ser. No. 341,376

Claims priority, application Switzerland, Apr. 29, 1988, 01609/88

Int. Cl.[5] D01G *15/76, 15/82*

U.S. Cl. 19—107 25 Claims





1. An apparatus for cleaning a card, said apparatus comprising

an air main for removable positioning against one side of a card for drawing a flow of air therethrough;

a plurality of suction orifices in said air main positioned for sealing abutment against air outlets of the card for drawing air from within the card; and

a movable frame having said air main mounted thereon and wheel means on said frame for rolling said frame from the card.

4,985,967

DRAFTING UNIT FOR A SPINNING MACHINE WITH MOVABLE COVER

Fritz Stahlecker, Josef-Neidhart-Strasse 18, 7347 Bad Uberkingen, and Hans Stahlecker, Haleenstrasse 20, 7334 Sussen, both of Fed. Rep. of Germany, assignors to Fritz Stahlecker and Hans Stahlecker, both of, Fed. Rep. of Germany

Filed Jan. 31, 1990, Ser. No. 473,161

Claims priority, application Fed. Rep. of Germany, Mar. 10, 1989, 3907745

Int. Cl.[5] D01H *1/16*

U.S. Cl. 19—267 17 Claims

1. A spinning machine arrangement including a plurality of adjacent spinning units and at least one drafting unit incorporated therewith, said drafting unit comprising:

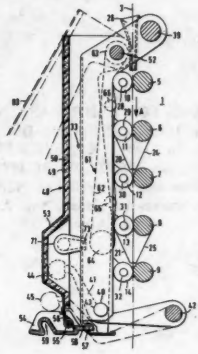
bottom rollers,

pressure rollers,

a load support for said pressure rollers, said loading support including means for accommodating holding devices for shafts of said pressure rollers, said loading support being pivotable around a supporting rod extending in parallel with respect to said bottom rollers between an operative position adjacent the bottom rollers for drafting operation and an inoperative position disposed further from the bottom rollers,

locking means for locking the loading support in its operative position,

said loading support having two arms extending parallel to and at a distance from one another so as to form pressure roller twins assigned to two adjacent ones of said spinning units, said two arms of said loading support being connected at their ends by means of respective cross-struts to form a frame which is disposed on the supporting rod in the area of one of the cross-struts, and



a pivotable loading support cover for covering the loading support, wherein said loading support cover is disposed such that it can be pivoted away when the loading support is locked in said operative position to accommodate maintenance of the loading support and pressure rollers without disturbing the loading support from its operative position.

4,985,968

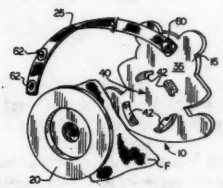
FASTENER MEANS FOR PACIFIERS, TOYS, BADGES AND LIKE ARTICLES

Fred V. Hooper, 540 Isley Pl., Burlington, N.C. 27215

Filed Sep. 29, 1989, Ser. No. 415,071

Int. Cl.[5] A44B *21/00*

U.S. Cl. 24—302 11 Claims



1. A fastening means for attaching a decorative button, teething ring, pacifier or other item to clothing, including:

(a) a female element comprising a body member having inner and outer faces, a plurality of prongs extending away from said inner face, said prongs having a lip means and being spaced apart substantially and arranged in a closed pattern; said prongs being somewhat flexible for releasably gripping a mating element therein;

(b) a male element including a locking disk member for releasable engagement beneath said lip means of said prongs with a portion of the item of clothing therebetween, said disk having an outer configuration slightly greater than the corresponding dimension between said closed pattern of prongs wherein said locking disk further includes an annular flange surrounding said disk and having an enlarged diameter, said flange being of such a size

and configuration as to the prevent swallowing by a small child; and

(c) said prongs and said locking disk member forming a locking means for gripping a portion of the clothing therebetween and preventing inadvertent dislodgement of said female member therefrom.

4,985,969

SLIDER FOR SLIDE FASTENERS

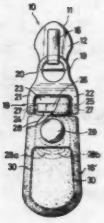
Yasuharu Terada, Uozu, and Susumu Ishii, Kurobe, both of Japan, assignors to Yoshida Kogyo, K.K., Tokyo, Japan

Continuation of Ser. No. 386,727, Jul. 31, 1989, abandoned. This application Jan. 12, 1990, Ser. No. 464,714

Claims priority, application Japan, Aug. 2, 1988, 63-193985

Int. Cl.[5] A44B *19/26*

U.S. Cl. 24—429 **3 Claims**



1. A slider pull tab for a slide fastener formed by cast molding into an integral structure which comprises a first connector, a second connector, a pull tab body integrally connected to said second connector and a pivotal pin which is formed integrally with either of said first and second connectors and about which said pull tab body is freely rotatable, said first and second connectors being formed by simultaneous cast molding, and said pull tab body being cast-molded from an elastic, flexible material.

4,985,970

SEAMING MACHINE TO MANUFACTURE AN INSERTION-TYPE SEAM FOR MAKING A CLOTH BELT ENDLESS

Bernhard Krenkel, and Heinz Joos, both of Heidenheim, Fed. Rep. of Germany, assignors to F. Oberdorfer GmbH & Co. KG IndustriegewebeTechnik, Fed. Rep. of Germany

Continuation-in-part of Ser. No. 78,992, Jul. 29, 1987, and a continuation-in-part of Ser. No. 68,631, Jun. 30, 1987, which is a continuation-in-part of Ser. No. 808,553, Dec. 13, 1985, said Ser. No. 78,992, is a continuation of Ser. No. 808,553, Dec. 13, 1985. This application Jul. 22, 1988, Ser. No. 222,771

Claims priority, application Fed. Rep. of Germany, Dec. 21, 1984, 3446941

Int. Cl.[5] D06H *5/00*; D03D *25/00*

U.S. Cl. 28—141 **14 Claims**

1. A seaming machine, comprising:

a frame;

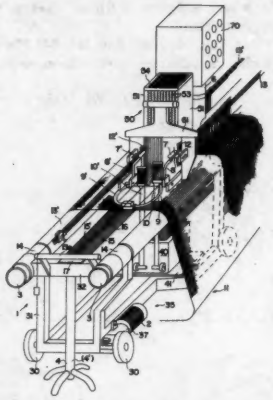
a machine table supported by said frame;

a supply of cloth;

means for separating the ends of said cloth into individual threads;

a plurality of parallel running wires extending lengthwise along said machine table;

means for transferring said individual threads to said machine table adjacent said wires; and



means for weaving said threads with said wires, wherein said means for weaving produces an endless belt of cloth.

4,985,971

PALLET CHANGER

Koichiro Kitamura, Takaoka, Japan, assignor to Kitamura Machinery Co., Ltd., Toyama, Japan

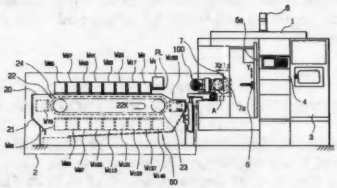
PCT No. PCT/JP88/00251, § 371 Date Sep. 15, 1989, § 102(e) Date Sep. 15, 1989, PCT Pub. No. WO88/06945, PCT Pub. Date Sep. 22, 1988

PCT Filed Mar. 10, 1988, Ser. No. 415,256

Claims priority, application Japan, Mar. 17, 1987, 62-60032

Int. Cl.[5] B23Q *7/04*

U.S. Cl. 29—33 P **10 Claims**



1. A pallet changer for a machine tool comprising:

(a) a workstation comprising a plurality of members which form holes for a plurality of pallets each having a workpiece, the members being arranged at predetermined intervals in an endless chain manner such that one of the members can be positioned at a predetermined position;

(b) a table for the machine tool for mounting one of the pallets; and

(c) a pallet transferor positioned between the workstation and the machine tool to exchange one of the pallets positioned at the predetermined position for the pallet mounted in the table, the pallet transferor comprising,

(1) a first mover arranged to be movable in a first direction parallel to the arrangement direction of the pallets positioned in the predetermined position,

(2) a swinger mounted with respect to the first mover, the swinger being rotatable at a predetermined angle,

(3) a second mover for moving the swinger along a second direction perpendicular to the first direction,

(4) a rotator operably arranged with the swinger,

(5) a third mover operably arranged with respect to the

rotater, the third mover being moved along a third direction perpendicular to the second direction, and

(6) first and second arms for detachably gripping the pallet positioned at the predetermined position and the pallet mounted on the table, the first and second arms being operably arranged with respect to the third mover such that the first and second arms can be rotated at a predetermined angle.

4,985,972

ROLL WITH DEFLECTION COMPENSATION

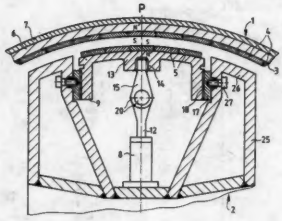
Hans-Peter Sollinger, and Zygmunt Madrzak, both of Heidenheim, Fed. Rep. of Germany, assignors to J. M. Voith GmbH, Heidenheim, Fed. Rep. of Germany

Filed May 29, 1990, Ser. No. 529,882

Claims priority, application Fed. Rep. of Germany, Jun. 6, 1989, 3918413

Int. Cl.[5] B21B *13/14*

U.S. Cl. 29—116.2 22 Claims



1. A roll with deflection compensation comprising:

an outer roll shell and an inner core carrier positioned generally within said outer roll shell, said roll shell having an inner layer, said inner layer being continuous at least in the peripheral direction, said inner layer consisting generally of permanent magnets and having an inside surface provided with only like poles of said magnets whereby said layer is radially magnetized,

said inner core carrier extending axially along the roll shell and having a plurality of pole carriers mounted therein, said pole carriers having magnets mounted thereon, said magnets being positioned so that like poles of the core carrier magnets and the roll shell magnets oppose one another, said core carrier magnets being positioned on a portion of the circumference of said core carrier in the area of an axially-extending major load plane, said core carrier magnets being mounted so as to be movable at least predominantly parallel to the direction of said major load plane and being supported by servoelements which act on said pole carriers.

4,985,973

MANUFACTURING METHOD FOR DIAPHRAGM SPRING

Yoshinari Yoshimura, and Ikuo Murata, both of Neyagawa, Japan, assignors to Kabushiki Kaisha Daikin Seisakusho, Osaka, Japan

PCT No. PCT/JP88/01270, § 371 Date Jul. 26, 1989, § 102(e) Date Jul. 26, 1989, PCT Pub. No. WO89/05699, PCT Pub. Date Jun. 29, 1989

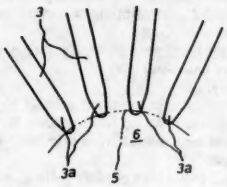
PCT Filed Dec. 14, 1988, Ser. No. 393,908

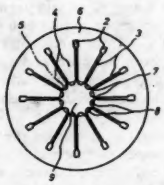
Claims priority, application Japan, Dec. 17, 1987, 62-319697

Int. Cl.[5] B23P *13/00*

U.S. Cl. 29—173 6 Claims

1. A two step method for manufacturing a diaphragm spring, having a circular center hole at a center of a disc-like blank, plural rectangular holes on an outer peripheral part of said disc-like blank with specified spaces left therebetween in a circumferential direction, plural ligulated fingers extending radially inwardly between radial slits, said slits each extending inwardly from one of said holes to said circular center hole, wherein inner peripheral parts of said fingers are pressed by a release bearing; comprising a step of punching said rectangular





holes and said slits out of said disc-like blank with a press work and a step of punching out said center hole with a gear-shaped press die having circular tip portions of the same width and spacing as that of said slits for forming circular tip end portions at tapered inner ends of said ligulated fingers.

4,985,974

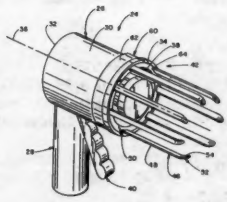
HAND-HELD DEVICE FOR REMOVING A PAINT ROLLER PAD FROM A PAINT ROLLER SUPPORTING FRAME

Mark Fivecoate, 670 E. 48th, Brooklyn, N.Y. 11203

Filed Apr. 7, 1990, Ser. No. 503,890

Int. Cl.[5] B25B *27/00*

U.S. Cl. 29—268 3 Claims



1. A hand-held device for removing a paint roller pad from a paint-roller supporting frame comprising:

(A) a housing which includes

(1) a handle section,

(2) a head section having an aft end located near said housing handle, a forward end, and a longitudinal axis extending between said aft end and said forward end, said head section having a trigger slot defined therein near said handle section and having a bore defined therein,

(3) a trigger lever extending through said trigger slot and having a top end located inside said housing head section, and a bottom end,

(4) a fulcrum mounting attached to said trigger lever between said trigger lever ends and pivotably mounting said trigger lever to said housing, and

(5) said trigger lever moving between a first position with said bottom end spaced from said handle section and a second position with said bottom end located closer to said housing handle section than said first position;

(B) a paint roller pad gripping assembly mounted on said housing and including

(1) a multiplicity of prongs, each prong of said multiplicity of prongs including

(a) a body,

(b) a proximal end mounted on said housing head section adjacent to said head section forward end,

(c) a distal end spaced from said head section forward end, and

(d) a paint roller pad engaging claw on said distal end, said claw extending at an angle with respect to said body towards said head section longitudinal axis,

(2) a collar encircling all of said prongs and being slidable along said prongs in a direction of said head section longitudinal axis from a releasing position adjacent to said head section forward end to a gripping position adjacent to said prong distal ends; and

(C) a piston mechanism slidably mounted in said head section bore and including

(1) a case having a bore defined therein,

(2) a collar mounted on one end of said case and having a blind-ended bore defined therein, said blind-ended bore snugly receiving said case, and said piston mechanism collar having an outer surface that snugly and slidably engages the inner surface of said housing head section adjacent to said housing head section bore,

(3) a piston element slidably mounted in said piston mechanism bore, said piston element having a rear and a front end,

(4) said piston element being slidably mounted in said piston mechanism bore to move along the longitudinal axis of said housing head section between a cocked position with said piston rear end located closely adjacent to said housing aft end and a releasing position with said piston rear end located closer to said housing section forward end,

(5) a connecting means connecting trigger lever top end to said piston, and

(6) an extension spring having one end thereof connected to said housing and another end connected to said piston rear end, said extension spring resisting movement of said piston from said cocked position toward said releasing position.

4,985,975

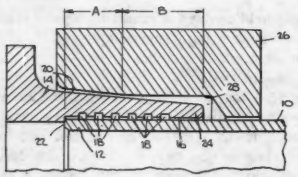
SYSTEM FOR ATTACHING A FITTING TO A TUBE

John S. Austin, Atlantic Beach, and Jeff D. Gruenberg, Jacksonville, both of Fla., assignors to Unidynamics Corporation, Jacksonville, Fla.

Filed Dec. 22, 1989, Ser. No. 456,158

Int. Cl.[5] B23Q *3/00*

U.S. Cl. 29—283.5 **7 Claims**



1. A system for attaching a plastically deformable tube to a fitting with two ends, said fitting having a bore extending into said fitting from one of said ends thereof, said bore forming a sliding fit with an end of said tube when said tube is inserted into said bore from said one end of said fitting, and said bore having plural, axially spaced grooves into which the wall of a portion of said tube at said end thereof is expanded by radial deformation thereof against said bore while said fitting is restrained radially by a die, wherein:

said die and said fitting have facing surfaces that form a radial gap that is larger proximate to said one end of said fitting than proximate to said end of said tube; and

said radial gap permits elastic deformation of said fitting during radial expansion of said tube.

4,985,976

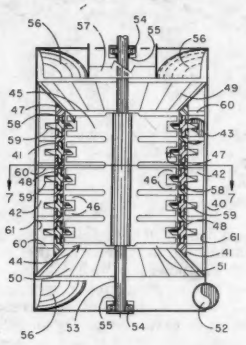
METHOD OF MAINTAINING THE AVERAGE OVERALL SHARPNESS OF THE BLADES IN A SHREDDING DEVICE AND APPARATUS

James A. Titmas, 347 Crain Ave., Kent, Ohio 44240, and Phillip J. Flauto, 2205 E. Streetsboro Rd., Hudson, Ohio 44326

Filed Nov. 30, 1989, Ser. No. 443,506

Int. Cl.[5] B02C *18/08, 18/18;* B23P *6/00*

U.S. Cl. 29—402.08 **11 Claims**



1. A method of maintaining the average overall sharpness of the blades in a shredding device, the blades being movable around vertically spaced circular tracks, with new blades to be received by the first of the tracks and old blades to be removed from the last of the tracks, comprising the steps of removing the oldest of the blades from each vertically spaced track, positioning the removed blades adjacent to the next adjacent track closest to the last track while at the same time positioning a new blade adjacent to the first track, and inserting the removed blades into the next adjacent tracks closest to the last track while at the same time inserting the new blade into the first track and discharging the oldest blade from the last track from the device.

4,985,977

METHOD OF AND APPARATUS FOR APPLYING TOP END STOPS ON TO A SLIDE FASTENER CHAIN

Tatsuo Osaki, Uozu, Japan, assignor to Yoshida Kogyo K. K., Tokyo, Japan

Filed Apr. 26, 1990, Ser. No. 514,931

Claims priority, application Japan, May 1, 1989, 1-113108

Int. Cl.[5] B29D *5/00*

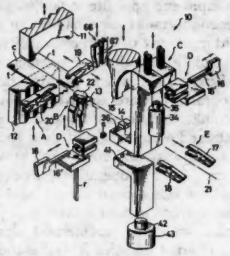
U.S. Cl. 29—408 **6 Claims**

1. A method of applying top end stops onto a slide fastener chain of continuous length which comprises the steps of

(a) forming a top end stop of substantially U-shaped cross-section from an elongate strip of thermoplastic resin;

(b) receiving and holding said top end stop in between an anvil and a supersonic or high frequency energy applying horn;

(c) transporting a slide fastener chain along a horizontal path of travel;
(d) moving said anvil and said horn together into alignment with said horizontal path;
(e) threading said fastener chain through said top end stop;
(f) moving said anvil against said horn to clamp said top end stop therebetween;



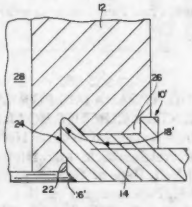
(g) attaching said top end stop by fusion to a portion of said fastener chain;
(h) separating said anvil from said horn and removing said portion of said fastener chain from said anvil for delivery out of said horizontal path; and
(i) moving said anvil and said horn together out of said horizontal path.

4,985,978

METHOD FOR ASSEMBLING A SELF-CLINCHING FASTENING STRUCTURE

John S. Milliser, Rochester, Ind., and James T. McGuire, Royal Oak, Mich., assignors to Textron Inc., Providence, R.I.

Division of Ser. No. 162,681, Mar. 1, 1988, Pat. No. 4,893,976. This application Apr. 5, 1989, Ser. No. 333,648
Int. Cl.[5] B23P *11/00*
U.S. Cl. 29—511 **10 Claims**



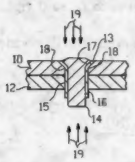
1. A method for assembling a self clinching fastener to a sheet material, comprising:
forming a through aperture in said sheet material;
forming an annular flange from peripheral material said aperture, said flange extending toward said fastener prior to insertion thereof through said flange and after formation of said flange,
inserting a shank portion of said fastener into said flange; and
clinching said fastener to said flange to secure assembly of said fastener and sheet material.

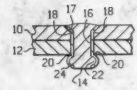
4,985,979

METHOD OF INSTALLING INTERFERENCE FIT SLEEVED FASTENERS HAVING RADIUSED INTERSECTION FOR STRESS COINING

Eugene R. Speakman, Fullerton, Calif., assignor to McDonnell Douglas Corporation, Long Beach, Calif.

Continuation of Ser. No. 298,936, Jan. 23, 1989, abandoned. This application Jan. 16, 1990, Ser. No. 464,686
Int. Cl.[5] B21D *39/00*; B23P *11/00*
U.S. Cl. 29—512 **28 Claims**





1. A method for fastening at least two solid layers together, these stacked together layers having a first outside surface and a second outside surface, in an overlapping, parallel relationship comprising:
forming a hole of a first diameter substantially perpendicular to the layers and passing completely therethrough;
inserting a non-split, collared constant wall thickness sleeve into the hole in a slop fit, the sleeve having a hollow, cylindrical portion having an inner and an outer diameters and first and second ends with a flange on the first end which forms a collar and the second end extending past the distal end of the hole after insertion, wherein the junction between the outer diameter of the sleeve and the flange is defined by a radiused intersection having a radius of between about 0.030 and about 0.040 inches said radius intersection seated against the first outer surface of the layers at the edge of the hole;
inserting a fastener into the inside of the sleeve, the fastener having a shank diameter sufficient to expand the sleeve into an interference fit with the hole of the layers and thereby stress coining the layer at the edge of the hole adjacent the radiused intersection of the sleeve; and
operating upon the end of the fastener extending past the second end of the sleeve to draw the flange on the first end of the sleeve flush against the first outer surface further stress coining the layer at edge of the hole and thereby fastening the layers together.

4,985,980

NET FORMING METHOD

Christopher E. Gould, 6630 E. Sweetwater Ave., Scottsdale, Ariz. 85254

Filed Oct. 27, 1989, Ser. No. 427,775
Int. Cl.[5] B23P *11/02*
U.S. Cl. 29—525.1 **5 Claims**

1. A method of forming a net comprising the steps of,
(1) providing a plurality of beverage container holders wherein each beverage container holder is formed of a single, flexible polymeric blank, and wherein each beverage container holder is formed with plural pairs of adjacent circumferential beverage container holder encom-

passing bands defining right and left columns of vertical bands, and

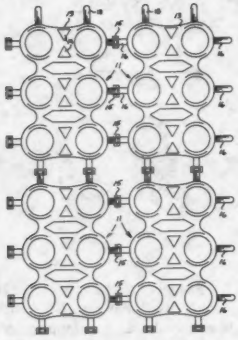
each beverage container holder including first connecting webs between adjacent vertical bands within said right and left columns, and

each beverage container holder further including second webs between pairs of adjacent horizontal right and left bands, and

(2) providing first connecting straps directed exteriorly of said right bands, and providing second straps directed exteriorly of said left bands, and

simultaneously providing third straps extending exteriorly of top right and left bands of said right and left columns of bands, and

simultaneously providing fourth connecting straps directed



downwardly of bottom bands of said right and left columns of bands, and

providing connector members at terminal ends of said second straps and said fourth straps, and

(3) forming a matrix of said beverage container holders wherein the beverage container holders are secured together, wherein the first straps of an individual beverage container holder is secured to adjoining second straps of a second beverage container holder, and

the third straps of a first beverage container holder are secured to fourth straps of a third beverage container holder and the fourth straps of the first beverage container holder are secured to the third straps of a fourth beverage container holder, and

the second straps of the first beverage container holder are secured to first straps of a fifth beverage container holder.

4,985,981

WORKPIECE TRANSFERRING MECHANISM OF FORMING PRESS

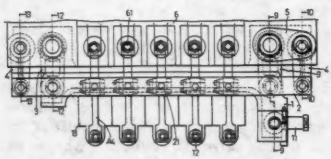
Sheng-Yau Wang, Tainan, Taiwan, assignor to Chun Zu Machinery Industry Co., Ltd., Tainan, Taiwan

Filed Jul. 12, 1990, Ser. No. 551,914

Claims priority, application Taiwan, May 16, 1990, 79205270

Int. Cl.[5] B23Q *7/14*; B21D *53/24*

U.S. Cl. 29—563 **1 Claim**



1. A workpiece transferring mechanism for a former which has a machine frame and a plurality of dies, said workpiece transferring mechanism including a plurality of aligned workpiece holding members each moving between a clamping position and a releasing position while moving between two of said dies to transfer a workpiece, an elongated crank support member disposed movably above said aligned workpiece holding members, a plurality of aligned first cranks mounted pivotally on said crank support member, each of said first cranks having an output end which reciprocates upward and downward and is connected to each of said workpiece holding members and an input end opposite to said output end, a plurality of aligned second cranks each having an output end disposed above said input end of each of said first cranks and an opposite input end, a plurality of pneumatically operated plungers each disposed below and pushing said input end of each of said first cranks upward against said output end of each of said second cranks, thereby clamping said input end of each of said first cranks and permitting said input end of each of said first cranks to turn upward and downward as well as to rotate, a plurality of cams each cooperatively associated with said input end of each of said second cranks, said cams actuating said second cranks which in turn actuate said first cranks, and a swinging mechanism to reciprocate said workpiece holding members between two of said dies as well as to reciprocate said crank support member synchronously with said workpiece holding members,

said swinging mechanism including an elongated swinging member extending longitudinally below said crank support member and supporting all of said workpiece holding members, said swinging member having two ends respectively extending at two sides of said workpiece holding members, a pair of first vertical pivot shafts provided fixedly on said machine frame on two sides said pneumatically operated plungers, a pair of first connecting members each connected to one of said vertical pivot shafts and one of said two ends of said swinging member, a reciprocating drive rod connected to said swinging member, and

improvements which comprise a pair of second vertical pivot shafts respectively disposed adjacent and aligned with said first vertical pivot shafts, a pair of second connecting members each connected to one of said second vertical pivot shafts and said elongated crank support member, a first eccentric member mounted on one of said first vertical pivot shafts above said first connecting member, a second eccentric member mounted on one of said second vertical pivot shafts above said second connecting member near said one of said first vertical pivot shafts, a third connecting member mounted on said first and second eccentric members, whereby the movement of the swinging member is transmitted to the elongated crank support member through said first, second and third connecting members and said first and second eccentric members.

4,985,982

PROCESS AND APPARATUS FOR CUTTING AND TRIMMING PRINTED CIRCUIT BOARD WORKPIECES

Hans-Günter Löhr, Wiernsheim; Gunter Herrmann, Cawl; Josef W. Mozzi, Unterreichenbach, and Dieter Claus, Rosbach-Rodheim, all of Fed. Rep. of Germany, assignors to Lohr & Herrmann GmbH, Neuhausen, Fed. Rep. of Germany

Filed Aug. 3, 1988, Ser. No. 227,656

Claims priority, application Fed. Rep. of Germany, Nov. 7, 1987, 3737868

Int. Cl.[5] B23C *5/14*; B23D *19/08, 33/02*

U.S. Cl. 29—566.001 **18 Claims**

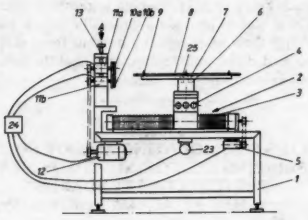
6. An apparatus for cutting and trimming printed circuit board workpieces, comprising

two circular sawblades, which extend in a common plane and have interdigitating sawteeth formed with a profiled side face on a first side of sawblades,

a sawblades drive means for rotating said sawblades in mutually opposite senses, and

feeding means for moving a printed circuit board workpiece

and said sawblades, on the other hand, relative to each other so that said workpiece extending through said plane is moved between said sawblades while said sawblades are rotated in mutually opposite senses to cut into mutually opposite broadsides of a printed circuit board workpiece having a given thickness and extending through said plane



in such a manner that the sawteeth of each of said sawblades cut into said workpiece only in part of its thickness, whereby a marginal portion is severed from said workpiece on a second side of said sawblades and a remaining part of said workpiece disposed on said one side of said sawblades is trimmed and is formed with an edge portion having a profile which is complementary to said profiled side face.

4,985,983

SHEET WORKING MACHINE WITH TOOL MAGAZINE

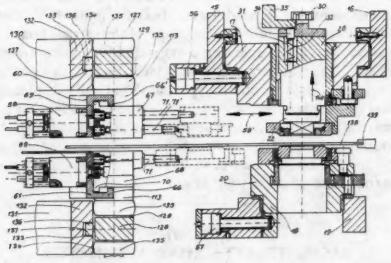
Gerhard Otto, and Walter Tamaschke, both of Alfeld, Fed. Rep. of Germany, assignors to C. Behrens AG, Alfeld, Fed. Rep. of Germany

Filed Jan. 13, 1988, Ser. No. 143,583

Claims priority, application Fed. Rep. of Germany, Jan. 23, 1987, 3701858

Int. Cl.[5] B23Q *3/155*

U.S. Cl. 29—568 **19 Claims**



1. A sheet working machine, comprising

a working station including a tool for working a plate-like workpiece, and drive means for driving said tool;

a chain-like tool magazine displaceable in a horizontal plane and guided, at least in a region of said working station, at a height corresponding to a height of the working station, and carrying a plurality of tools; and

at least one stationary tool exchange device for transferring tools from said tool magazine to said working station;

said tool magazine including a plurality of articulated connected with each other chain links, a plurality of tool supports associated with said plurality of chain links, respectively, with each tool support being displaceable relative to an associated chain link and having handling means for engaging at least one tool, and arresting means for locking said tool magazine in a predetermined position;

said stationary tool exchange device including a displacement drive connectable with said tool supports due to movement of said tool magazine along a displacement path thereof for linearly displacing said tool supports, and a rotary drive providing for a locking function of said handling means;

said working station further including at least one linearly displaceable carriage, at least two tool receiving systems associated with said linearly displaceable carriage, and tool driving means, said two tool receiving systems being selectively connectable with said tool driving means for driving the tools, with a tool receiving system which is not connected with said tool driving system, being connectable with said stationary tool exchange device for effecting tool exchange;

said tool magazine being displaceable, in a region of said working station or said tool exchange device, parallel to said carriage with said carriage being arrested in a position in which at least one tool receiving system associated therewith is located opposite said stationary tool exchange device to provide for transferring of a tool supported on a tool support of a chain link of said tool magazine into said one tool receiving system by linear displacement of said tool support which takes place due to actuation of said stationary tool exchange device.

4,985,984

IGNITION COIL FOR INTERNAL COMBUSTION ENGINE

Tomokazu Umezaki, Hogyo, Japan, assignor to Mitsubishi Denki Kabushiki Kaisha, Tokyo, Japan

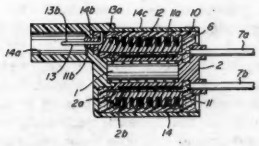
PCT No. PCT/JP87/01003, § 371 Date Jun. 27, 1988, § 102(e) Date Jun. 27, 1988

PCT Filed Dec. 21, 1987, Ser. No. 219,154

Claims priority, application Japan, Dec. 26, 1986, 61-203245

Int. Cl.[5] H01F *41/02, 27/04*

U.S. Cl. 29—602.1 **27 Claims**



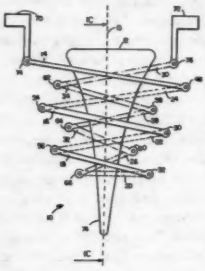
1. A method of fabricating an ignition coil for an internal combustion engine comprising the steps of: providing an iron core, a primary coil portion arranged about the iron core, a secondary coil portion arranged about the primary coil portion, a casing made of a synthetic resin adapted to enclose the iron core, the primary coil portion and the secondary coil portion and including an engaging portion having a hole, and a thermosetting resin which is charged into the casing and hardened, thereby fixing the iron core, the primary coil portion and the secondary coil portion, providing a high voltage terminal and a bobbin with a projecting portion as part of the secondary coil portion, said high voltage terminal having at least one connecting portion, forming the one connecting portion of the high voltage terminal in at least the projecting portion of the bobbin, and inserting the projecting portion of the bobbin into the engaging portion of the casing with said connecting portion and said projecting portion extending into said hole and said engaging portion engaging said projecting portion.

4,985,985

SOLENOIDAL THIN FILM READ/WRITE HEAD FOR COMPUTER MASS STORAGE DEVICE AND METHOD OF MAKING SAME

Shyam C. Das, Acton, Mass., assignor to Digital Equipment Corporation, Maynard, Mass.

Filed Jul. 1, 1987, Ser. No. 69,408
Int. Cl.[5] G11B 5/127
U.S. Cl. 29—603 21 Claims



1. A method of fabricating a thin film read/write head for use in a magnetic storage device in a digital data processing system, the head being of the kind that includes at least one pole piece having a distal end adapted to be disposed adjacent a storage medium and a proximal end opposite thereto, said pole piece defining a longitudinal axis between said ends, comprising the steps of

A. providing an insulating substrate;

B. depositing a first electrically-conductive trace portion on said substrate in a first skewed direction with respect to said longitudinal axis;

C. depositing a first insulating layer over said substrate and said first trace portion;

D. disposing the pole piece on said first insulating layer;

E. depositing a second insulating layer over said pole piece and said first insulating layer;

F. depositing a second electrically-conductive trace portion on said second insulating layer in a second skewed direction with respect to said longitudinal axis, said second skewed direction being different than said first skewed direction; and

G. producing vias between ends of traces of said first trace portion and ends of vias of said second trace portion to interconnect said traces in the form of a pair of serially coupled solenoids that are each electrically insulated from and disposed around said pole piece, said solenoids being continuous between a pair of ends adjacent to said proximal end of said pole piece to provide a generally helical path for the flow of energizing current around said pole piece, a first one of said solenoids extending from said proximal end of said pole piece to a region of said distal end of said pole piece, and a second one of said solenoids returning from said region of said distal end to said proximal end of said pole piece.

9. A method of fabricating a head for use in a magnetic storage device, the head being of the kind that includes at least one pole piece disposed along a longitudinal axis and having a distal end adapted to be disposed adjacent to a storage medium of the magnetic storage device, comprising the steps of

depositing a first set of electrically-conductive traces over an insulating substrate at an angle with respect to the longitudinal axis,

depositing a first insulating layer over said first set of traces,

disposing the pole piece on the first insulating layer,

depositing a second insulating layer over the pole piece,

depositing a second set of electrically-conductive traces over the second insulating layer at an angle with respect to the longitudinal axis, and

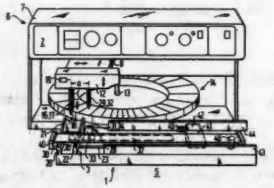
selectively interconnecting traces of the first and second sets of traces through the first and second insulating layers to form a pair of solenoids that are each electrically insulated from and disposed around said pole piece, each of said solenoids extending from said proximal end of said pole piece to a region of said distal end of said pole piece, said solenoids being serially coupled together in said region of said distal end to provide a generally helical path for the round trip flow of energizing current from said proximal end to said distal end region, and back to said proximal end, all around said pole piece.

4,985,986

APPARATUS FOR MOUNTING AND/OR SOLDERING OR CEMENTING ELECTRONIC COMPONENTS ON PRINTED CIRCUIT BOARDS

Adalbert Fritsch, Haus Nr. 46, 8455 Kastl, Fed. Rep. of Germany

Filed Jun. 2, 1989, Ser. No. 360,003
Claims priority, application Fed. Rep. of Germany, Jun. 3, 1988, 3818889
Int. Cl.[5] H05K 3/30; B23P 19/00
U.S. Cl. 29—740 21 Claims



1. Apparatus for mounting and soldering or cementing electronic components on printed circuit boards, having a first carrier for at least one circuit board and a second carrier for the component, the second carrier being displaceable relative to the first carrier parallel to the plane of the circuit board and transverse thereto, and having a magazine for the component, wherein the second carrier has associated therewith a positioning device having a positioning part automatically displaceable parallel to the plane of the circuit board to the mounting point and having a positioning element on the second carrier which is brought into operative connection with the positioning part to position the second carrier in respect to its movement parallel to the plane of the circuit board.

4,985,987

FASTENER ATTACHING APPARATUS

Volker Schmidt, 4638 Todds Rd., and Eric A. Schmidt, 2415 Liberty Rd., both of Lexington, Ky. 40509

Filed Jan. 11, 1990, Ser. No. 463,488
Int. Cl.[5] A41H 37/04
U.S. Cl. 29—788 20 Claims

1. An apparatus for attaching a two prong element and a non-symmetrical shaped element to material at a setting station including:

anvil means and ram means at the setting station;

activating means for activating said anvil means and said ram means to move said anvil means and said ram means toward each other, each of said ram means and said anvil means being movable only axially;

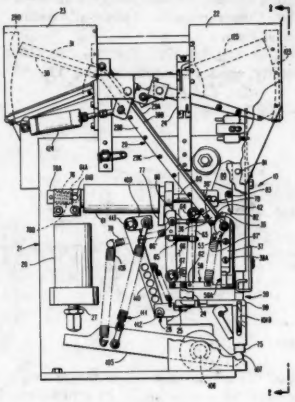
a first hopper having a plurality of two prong elements therein;

a second hopper having a plurality of non-symmetrical shaped elements therein;

each of the non-symmetrical shaped elements having two holes therein to receive the prongs on the two prong element;

first transport means for transporting each of the two prong elements from said first hopper to a position at the setting station in a specific orientation for engagement by said anvil means;

second transport means for transporting each of the non-symmetrical shaped elements from said second hopper to the setting station for engagement by said ram means, said second transport means transporting each of the non-symmetrical shaped elements from said second hopper in a first orientation;



and said second transport means having cooperating means for cooperating with each of the non-symmetrical shaped elements prior to its disposition at the setting station to dispose each of the non-symmetrical shaped elements in a second orientation, different from the first orientation, for engagement by said ram means with the two holes in the non-symmetrical shaped element oriented to receive the two prongs of the two prong element engaged by said anvil means.

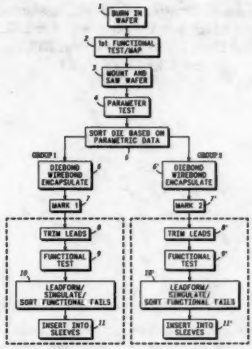
4,985,988

METHOD FOR ASSEMBLING, TESTING, AND PACKAGING INTEGRATED CIRCUITS

Hugh W. Littlebury, Chandler, Ariz., assignor to Motorola, Inc., Schaumburg, Ill.

Filed Nov. 3, 1989, Ser. No. 431,353
Int. Cl.[5] H01R *43/00*
U.S. Cl. 29—827 **11 Claims**

1. A method for assembling, testing, and packaging integrated circuits (ICs) comprising the steps of: providing the ICs on a wafer; burning-in the ICs in wafer form; mounting the wafer on a support; separating the ICs from each other so that the ICs remain mounted to the support; parametrically testing the ICs and speed-sorting the ICs; removing the ICs from the support and bonding them to a leadframe, wherein the leadframe comprises a plurality of leads which extend away from each of the ICs; encapsulating each of the ICs and a portion of the leads; marking a part identification on the encapsulated ICs; trimming the plurality of leads to electrically isolate them from each other; functionally testing the encapsulated ICs by coupling a tester to the plurality of leads; separating the encapsulated ICs from the leadframe; and inserting the encapsulated ICs which pass the functional testing into a sleeve.

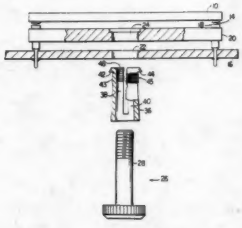


4,985,989

METHOD AND APPARATUS FOR REMOVING A MULTI-PIN COMPONENT INSTALLED IN SOCKETS ON A CIRCUIT BOARD

James V. Murphy, Warwick, R.I., assignor to Advanced Interconnections Corporation, West Warwick, R.I.

Filed Nov. 9, 1989, Ser. No. 434,006
Int. Cl.[5] H05K *3/30*
U.S. Cl. 29—829 **13 Claims**



1. Apparatus for removing a multicontact component installed in sockets on a circuit board, said component having a lower surface facing said circuit board, said apparatus comprising:

at least one elongated post for providing an upward force on said lower surface of said component to remove said component from said sockets, said at least one elongated post having a screw-threaded portion and

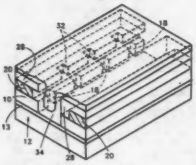
at least one screw member mechanically coupled to said post so that rotation of said post causes longitudinal movement of said post toward said lower surface thereby effecting said upward force.

4,985,990

METHOD OF FORMING CONDUCTORS WITHIN AN INSULATING SUBSTRATE

John E. Cronin, Milton; Carter W. Kaanta, Colchester, and Michael A. Leach, Bristol, all of Vt., assignors to International Business Machines Corporation, Armonk, N.Y.

Filed Dec. 14, 1988, Ser. No. 285,186
Int. Cl.[5] H01K 3/10
U.S. Cl. 29—852 14 Claims



1. A method of providing an electrically conductive material between two layers of insulating material, said method comprising the steps of;

providing first, second and third layers of insulating material, wherein said first and third layers are separated by said second layer, said second layer having an etch rate that differs from that of said first and third layers, exposing at least one edge portion of said first, second and third layers of insulating material, selectively removing the exposed edge portion of said second insulating material to provide a slot between said first and third layers of insulating material, thereafter depositing conductive material in said slot and around said exposed edge portions of the first and third layers of insulating materials, and removing the conductive material laying outside said slot on said exposed edge portions.

4,985,991

METHOD OF MAKING A SCREW-ON ELECTRICAL CONNECTOR

Jerome W. Finn, Waterman, Ill., assignor to Ideal Industries, Inc., Sycamore, Ill.

Filed Apr. 21, 1989, Ser. No. 342,097
Int. Cl.[5] H01R 43/02
U.S. Cl. 29—878 9 Claims

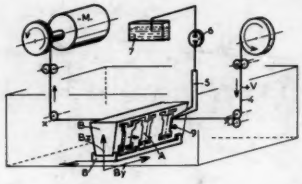
1. A method of making an electrical connector of the screw-on type which includes a shell of thermoplastic insulating material having a central bore closed at one end by an integral end wall and open at the other end and a generally tapered wire coil of a size and shape to be disposed in the central bore and arranged to receive and be turned down on stripped ends of the wires by rotation of the shell and coil relative to the wires, including the steps of disposing the shell and coil in aligned relation, the small end of the coil toward the open end of the bore of the cap, causing the coil and shell to be brought together with the coil in the bore of the shell, supplying sufficient heat to the bore of the shell to soften it and cause it to flow into an adherent relationship with the outer portions of the coil and, at the same time applying sufficient axial pressure between the coil and shell so as to cause the coil to be further inserted in the shell, and discontinuing the heating and axial pressure step when an interlock has been created between the exterior of the coil and the interior of the shell sufficient to withstand the forces involved in turning the finished connector down on the stripped ends of the wires and, at the same time, the coil and shell have been brought to a predetermined axial relation.

4,985,992

METHOD OF MAKING STATOR STAGES FOR COMPRESSORS AND TURBINES, AND STATOR VANES AND VANE ARRAYS PRODUCED THEREBY

Michel Voegien, Creteil, France, assignor to Societe National d'Etude et de Construction de Moteurs d'Aviation "S.N.E.C.-M.A.", Paris, France

Filed Aug. 10, 1988, Ser. No. 230,450
Claims priority, application France, Aug. 12, 1987, 87 11454
Int. Cl.[5] B23P 1/08, 15/00
U.S. Cl. 29—889.7 13 Claims



1. A method of making an array of flow straightener vanes for a compressor or turbine stator of a turbo-machine, each vane including a root, a blade and a head, said method comprising the following steps:

(a) milling a bar to provide said bar with an isosceles trapezoidal section having an apical angle α equal to $2\pi/n$ where n is the number of vanes in said array to be made;

(b) cutting vane blanks from said bar by cutting, perpendicularly to the plane of symmetry of said bar, the outline shape of each vane blank taken across the thickness of said blank between its upstream and downstream edges with respect to said array to be made, whereby said outline defines the head and the root of the vane, said root including an outer cut-out;

(c) machining each vane blank to form the back and the face of the blade of the vane;

(d) carrying out finishing operations on each vane thus formed;

(e) welding said vanes edge to edge to form a sector or a complete annular array; and,

(f) carrying out further turning operations on the annular bearing surfaces formed by said heads and said roots of said vanes in said sector or array.

4,985,993

METHOD FOR PRODUCING WHEEL RIM

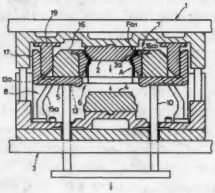
Nagatada Yagi; Motoatsu Shiraishi; Shizuo Kimura; Yukihisa Watano; Mitsuki Nakamura, and Shinji Shinozawa, all of Sayama, Japan, assignors to Honda Giken Kogyo Kabushiki Kaisha, Tokyo, Japan

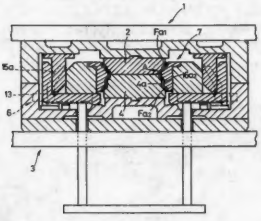
Filed May 11, 1990, Ser. No. 522,809
Claims priority, application Japan, May 15, 1989, 1-120949; May 18, 1989, 1-122981
Int. Cl.[5] B21K 1/38
U.S. Cl. 29—894.353 7 Claims

1. A method for producing a wheel rim of an automotive vehicle including a press forming procedure for forming a cylindrical body formed of a metal material into the wheel rim having flange portions of prescribed shape by press working, said press forming procedure comprising the steps of support-

ing said cylindrical body at a lower end surface thereof on a vertical axis between an upper punch attached to an upper mold and a lower punch attached to a lower mold; fitting a side die to an outer peripheral surface of said cylindrical body, with said cylindrical body supported; then lowering said upper punch together with the upper mold to insert the upper punch into an upper portion of said cylindrical body and to form the upper end portion of said cylindrical body into said flange portion by press forming between said upper punch and said side die; thereafter releasing said cylindrical body from the supported state at its lower end surface; and further lowering said upper punch together with said side die and said cylindrical body to insert the lower punch into a lower portion of said cylindrical body and to form the lower end portion of said cylindrical body into said flange portion by press forming between said lower punch and said side die.

6. A method for producing a wheel rim of an automotive vehicle having flange portions formed on both sides of a cylindrical well portion positioned around the center of the wheel rim, the flange portions being formed into step shape having two steps by first step portions, first side wall portions, second





step portions and second side wall portions, respectively, in turn from both ends of the well portion to opening ends of the wheel rim, both the first side wall portions having hump portions curved and projected outward, both the second side wall portions or rim end portions being curved so as to project outward, which comprises the steps of forming both end portions of a cylindrical body formed of a metal material and having the same diameter as the well portion into flange portions having almost the same shape as the above flange portions and having the first step portions, the first side wall portions, the second step portions and the second side wall portions which are smooth; and then, laterally fitting a divided side die to an outer peripheral surface of the cylindrical body having both said flange portions formed and axially pressing said cylindrical body between a pair of punches inserted into both said flange portions, respectively, thereby curving prescribed portions of the first side wall portions of the respective flange portions toward concaves formed on said side die to form said hump portions and curving the second side wall portions of the respective flange portions toward concaves formed on said side die to form said rim end portions.

4,985,994

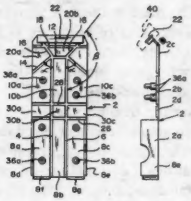
FOLDING HANDLE FOR TWIN BLADE CARTRIDGE

George Tavolieri, 222 N. Calle El Segundo #532, Palm Springs, Calif. 92262

Continuation-in-part of Ser. No. 200,725, May 31, 1988. This application Sep. 29, 1989, Ser. No. 414,296

Int. Cl.[5] B26B *21/00*

U.S. Cl. 30—47 1 Claim



1. A disposable razor handle for use with a twin blade cartridge containing a longitudinally extending mounting slot, comprising:

a generally rectangular foldable blank (2) formed of synthetic plastic material and including base (*2a*), intermediate (*2b*), head (*2c*) portions, said blank also including a connecting portion (*2d*) between said base and intermediate portions,

(1) said blank containing a pair of spaced longitudinal fold lines (4,6) extending successively the length of said base, said connecting and said intermediate portions and defining in each thereof a center panel (*8b*, *30b*, *10b*) arranged between a pair of side panels (*8a*, *8c*,; *30a*, *30c*; *10a*, *10c*);

(2) said blank containing a transverse first fold line (12) extending between first ends of said longitudinal fold lines adjacent said head portions, a pair of second fold lines (14) extending outwardly at an acute angle (α) from said first ends of said longitudinal fold lines, a pair of third fold lines (16) extending outwardly at an obtuse angle (β) from said first ends of said longitudinal fold lines, a transverse fourth fold line (18) extending between said third fold lines and cooperating to form in said head portion a trapezoidal central panel portion (*20b*), said second and third fold lines cooperating to define generally triangular side panels (*20a*, *20c*) in said head portion;

(3) a pair of longitudinal handle stabilizing panels (*8d*, *8e*) connected with the free edges of, and extending normal to one side of, said base side panels, respectively, the height of each of said stabilizing panels being generally equal to the width of said center base panel;

(4) a pair of base end panels (*8f*, *8g*) secured to the free ends of, and arranged normal to, said one side of said base side panels, respectively, the height of each of said end panels being generally equal to the width of said center base panel;

(5) a transverse blade mounting panel (22) connected with said transverse fourth fold line and arranged at an angle relative to said trapezoidal central head panel portion;

(6) said blank further containing spaced transverse fifth (26) and sixth (28) fold lines cooperating with said longitudinal fold lines to define said center connecting panel (*30b*) and said pair of spaced independent connecting side panels (*30a*, *30c*);

(7) first means operable when said intermediate side panels are folded to positions normal to said intermediate base panel for fastening together said intermediate side panels, thereby causing:

(a) said triangular head side panels to support said blade mounting panel for slidable insertion within said cartridge mounting slot, and

(b) said connecting side walls to be in spaced independent

relation relative to each other without any connecting means extending therebetween;

(8) second means operable when said base side panels are folded to positions normal to said base center panel for fastening together said base side panels, thereby causing said stabilizing panels and said end panels to be in overlapping relation, respectively;

(9) said first and second means for fastening together said base side panels and said intermediate side panels comprising cooperating male and female snap fastener means (*36a, 36b*) on adjacent faces of said base and intermediate side panels, respectively, the adjacent faces of said connecting side panels, when said blank is in the folded condition, being planar and unadorned; and

(10) means imparting flexibility to said connecting side panels to facilitate manual connection of said first and second fastening means, respectively, comprising a plurality of linear indentations (32) contained in the outer surfaces of said connecting side panels and extending generally parallel with said fifth and sixth transverse fold lines.

4,985,995

RAZOR HEAD, ESPECIALLY A RAZOR BLADE UNIT

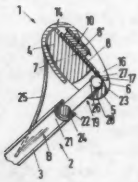
Dave Coffin, Norwich, United Kingdom, assignor to Wilkinson Sword Gesellschaft mit beschränkter Haftung, Solingen, Fed. Rep. of Germany

Filed Aug. 31, 1989, Ser. No. 401,019

Claims priority, application Fed. Rep. of Germany, Sep. 8, 1988, 8811356[U]

Int. Cl.[5] B26B *21/14*

U.S. Cl. 30—84 **10 Claims**



1. In a razor head, especially a razor blade unit, having razor blade means fixedly disposed in a plastic housing and resting on a blade support of said plastic housing, whereby if said razor blade means is a double razor blade, a spacer is disposed between the two blades thereof, the improvement wherein:

said plastic housing has an opening for said razor blade means, with said opening being accessible from above, and with said razor blade means being introduced into said opening from above onto said blade support of said plastic housing;

a cover means is placed on said plastic housing to both thereby fixedly and firmly hold said cover means in a secured position on said plastic housing, with said razor blade means also being fixed unreleasably on said blade support in a location between said cover means and said blade support of said plastic housing; and

engagement means is provided between said cover means and said plastic housing; said cover means being a cap that has an essentially U-shaped cross-sectional profile, is placed upon said plastic housing from the rear, and extends over essentially the entire length of said plastic housing.

4,985,996

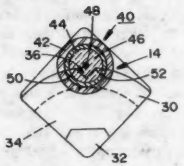
WIRE STRIPPER WITH V-NOTCH BLADE

Richard A. Steiner, East Haddam, Conn., assignor to Rostra Tool Company, Branford, Conn.

Filed Aug. 25, 1989, Ser. No. 398,579

Int. Cl.[5] B21F *13/00*; B26B *27/00*; H02G *1/12*

U.S. Cl. 30—90.1 **3 Claims**



1. A wire stripper for a wire or cable having an insulation layer and having a center conductor, comprising:

(a) a body;

(b) a cutting blade mounted in said body, said cutting blade having a V-notch in a cutting edge thereof, said cutting blade being so disposed that the corners thereof will cut into said wire or cable when said wire or cable is brought into cutting engagement with said cutting edge of said cutting blade; and

(c) means to bring said cutting edge of said cutting blade into cutting engagement with said insulation layer of said wire or cable such that rotation of said wire stripper about said wire or cable will cause said corners of said V-notch to cut through said insulation layer while defining a circle spaced from and concentric with said center conductor.

4,985,997

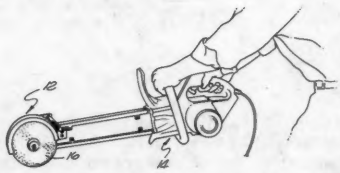
CHAIN SAW ATTACHMENT

Donald S. Gross, Sr., 24462 Eucalyptus, Moreno Valley, Calif. 92388

Continuation of Ser. 305,073, Feb. 2, 1989, abandoned.

Int. Cl.[5] B23D *45/16*

U.S. Cl. 30—122 **1 Claim**



1. A chain saw attachment for driving a circular member from a saw chain comprising:

a chain mounted on a chain guide an driven by a chain saw motor;

a sprocket mounted at one end of said chain guide and rotatable with said chain:

a spindle secured to said sprocket and rotatable therewith, said sprocket spindle having a pair of bearings mounted thereon, each bearing mounted on an opposite side of said sprocket;

means for mounting said circular member on either side of said chain guide comprising a pair of identically shaped housing members each surrounding said sprocket spindle, at least one of said housing members having a central opening for enabling said spindle to pass therethrough and each having an integrally formed flanged section attached to the chain guide, each housing member having a cup-shaped recess for enabling said bearings to be inserted

therein, each of said housing members being reversibly positioned on either side of said chain guide, each of said flange sections extending from said cup-shaped recesses toward said chain guide; and

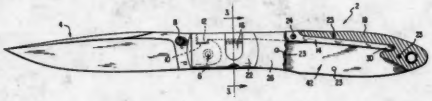
means for connecting said circular member to said sprocket spindle for enabling said member to rotate with said spindle.

4,985,998

KNIFE WITH BLADE LOCK

Durvya M. Howard, Rt. 5, Box 77, Gasden, Ala. 35903

Filed Nov. 9, 1989, Ser. No. 434,996
Int. Cl.[5] B26B *3/06*
U.S. Cl. 30—158 7 Claims



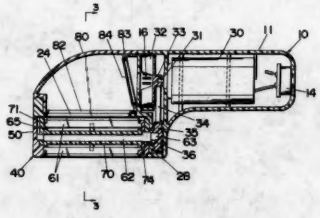
1. A knife comprising a handle, a blade pivotally mounted to said handle, locking bar means mounted on said handle for engaging said blade when said blade is in an open position, a release lever comprising a lateral portion and a projection extending transverse to said lateral portion, and means for pivotally mounting said release lever to said handle, wherein said lateral portion includes an outer surface which is of a width sufficient to be engaged by the thumb of a user and depressed without said thumb engaging said handle and which is substantially flush with the surface of said handle adjacent said lateral portion before said lateral portion is depressed, said handle includes a recess for receiving said lateral portion when said lateral portion is depressed, and said projection engages a surface of said locking bar upon depression of said lateral portion for disengaging said locking bar from said blade.

4,985,999

HAND-HELD CLIPPER FOR REMOVING ENTANGLED FIBERS FROM THE SURFACE OF FABRICS

Jyuzaemon Iwasaki, Nagahama; Hideharu Nakano, Oumihachiman; Masahiro Tsuno, and Zenichi Nakamura, both of Hikone, all of Japan, assignors to Matsushita Electric Works, Ltd., Japan

Filed Oct. 10, 1989, Ser. No. 419,398
Claims priority, application Japan, Oct. 15, 1988, 63-259801; Oct. 15, 1988, 63-259802
Int. Cl.[5] B26B *19/14, 19/12;* B25F *3/00*
U.S. Cl. 30—206 10 Claims



1. A hand-held clipper for removing entangled fibers from the surface of fabrics comprising:

a grip handle with a cutting head;

said cutting head comprising a shear foil having a number of perforations and a rotary cutter assembly having at least one cutter blade in shearing relation with the inner surface of said shear foil;

said shear foil being curved into a generally semi-cylindrical configuration to have a longitudinal axis and define a top portion and first and second side faces on opposite sides of said top portion;

said rotary cutter assembly having a rotation axis which is common to said longitudinal axis of said shear foil;

said blade having an elongated cutting edge extending in parallel to said rotation axis and being driven to rotate thereabout in one direction to move from said first side face to said second side face in continuous shearing engagement therewith for shearing the entangled strands of fibers entering the perforations in said shear foil; and

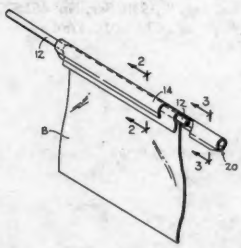
said shear foil having the perforations larger at said first side face than at said second side face and at the top portion.

4,986,000

BAG SEALER AND CUTTER

Richard L. Mills, 6528 Almaden Rd., San Jose, Calif. 95120

Filed Jan. 23, 1989, Ser. No. 299,607
Int. Cl.[5] B26B *3/00*
U.S. Cl. 30—278 4 Claims



1. A bag sealer which comprises

an elongated core member over which the end of a bag can be placed, and

an elongated cover member slightly larger than said core member and composed of resilient material with a longitudinal slot extending the entire length thereof enabling snapped reception over said core member and a bag thereon whereby the bag is pressed between said core member and aid cover member.

4,986,001

ADJUSTABLE TELESCOPE MOUNT FOR AN ARCHERY BOW

Frank J. Glamattei, 34 Shipp St., Newburgh, N.Y. 12550

Filed Feb. 20, 1990, Ser. No. 482,341
Int. Cl.[5] F41G *1/38*
U.S. Cl. 33—265 18 Claims

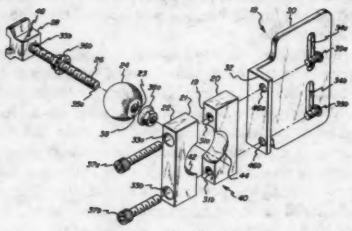
1. A telescope mount for an archery bow, said telescope mount comprising:

(a) a threaded rod, said threaded rod being capable of receiving a telescope at a first end;

(b) a ball having a threaded hole therethrough, said threaded hole being sized to receive a second end of said threaded rod;

(c) means for adjustably clamping said ball, and means for affixing said adjustable clamping means to said bow, whereby when said threaded rod engages a telescope at said first end and said ball at said second end, and said ball

is clamped by said adjustable clamping means, and said clamping means is attached to said bow, said telescope has



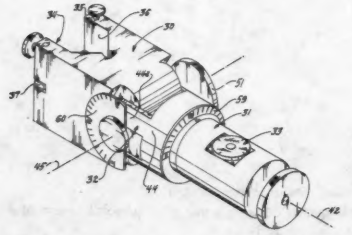
the capability of being adjusted in three dimensions relative to said bow.

4,986,002

QUICK SETTING ANGLE DEVICE FOR A WELDING TORCH

Alvin K. Oros, Farmington Hills; Rudolf P. Noworyta, Dearborn, and Fred G. Sawyer, Allen Park, all of Mich., assignors to Ford Motor Company, Dearborn, Mich.

Filed Jan. 9, 1990, Ser. No. 462,522
Int. Cl.[5] G01C *9/36*
U.S. Cl. 33—354 1 Claim



1. A torch angle measuring device for a welding torch having a nozzle with a nozzle axis and within which is carried an electrode wire coincident with the nozzle axis, comprising:

(a) a support rigidly clampable to said nozzle;

(b) a reference member;

(c) joint means between said reference member and support providing axes of rotational movement therebetween, said axes being at 90° to each other and each being transverse by 90° to the nozzle axis, and plumb level means on said reference member for displaying levelness in planes parallel to said joint means axes, said joint means comprising a first pin axis supported on said support and a yoke rotatably supported on the ends of said pin axis, a second pin axis extending integrally outwardly from said yoke upon which is rotatably mounted said reference member.

4,986,003

CALIBRATION TOOL

Chris DoCarmo, Springfield, Mass., assignor to United Technologies Corporation, Hartford, Conn.

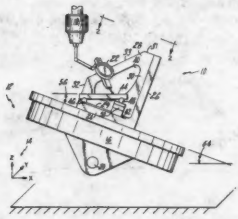
Filed Dec. 4, 1989, Ser. No. 445,258
Int. Cl.[5] G01B *3/30*
U.S. Cl. 33—502 2 Claims

1. Method of calibrating a jig bore having a bore, a tiltable jig, and a support table having said jig mounted thereon, said bore translating in parallel to a z-axis, said table being in parallel to an x-y plane, said method comprising the steps of:

mounting an apparatus for calibrating a tiltable jig bore upon said said apparatus having;

a dimensionally stable first plate disposed in parallel to said x-y plane,

a dimensionally stable second plate attaching at one end thereof to said first plate, said second plate being disposed in parallel to a y-z plane, and



a dimensionally stable third plate, said third plate having a first surface attaching to said first plate, having a second surface attaching to said second plate, and having a third surface disposed at a given calibration angle to said first and second plates, said third plate being disposed in parallel to an x-z plane,

mounting a surface gage within said bore,

tilting said tiltable jig to said given calibration angle

placing the surface gage upon said third surface, and

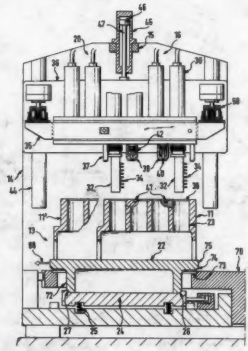
translating said table such that said surface gage travels along said third surface.

4,986,004

METHOD AND APPARATUS FOR MEASURING THE CONFIGURATION OF CYLINDER BORES IN WORKPIECES

Rudolf Hartmann, Karlsbad-Auerbach; Knud Overlach, and Günter Suchanek, both of Ettlingen, all of Fed. Rep. of Germany, assignors to PAT Messtechnik GmbH, Karlsruhe, Fed. Rep. of Germany

Filed Jan. 3, 1990, Ser. No. 460,501
Claims priority, application Fed. Rep. of Germany, Jan. 4, 1989, 3900106
Int. Cl.[5] G01B *7/12*
U.S. Cl. 33—555.1 17 Claims



2. An arrangement for measuring the configuration of cylin-

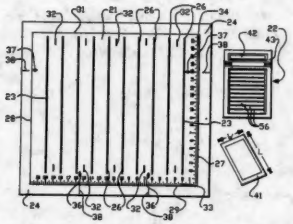
der bores in workpieces, particularly engine blocks of internal combustion engines, comprising: a measuring head with at least one measuring probe for insertion into a cylinder bore, said cylinder bore having a cylinder wall, said measuring probe being inserted into said cylinder bore without contacting said cylinder wall; measuring sensors on said probe and spaced from each other in longitudinal direction of said probe; said measuring sensors having sensing pins projecting radially beyond a peripheral surface of said probe without contacting said cylinder wall; means for displacing said probe and workpiece relative to one another transversely to an axis of said cylinder bore and bringing thereby said sensing pins into contact with said cylinder wall; means for fixing said measuring head in a fixed position relative to the workpiece; means for holding the fixed position by a force urging said measuring head and workpiece into mutual fixed positions; means for seating the workpiece resiliently and decoupling said measuring head from other neighboring elements to fix said measuring head in position only relative to the workpiece; said sensing pins sensing said cylinder wall on adjacent parallel circles to measure the configuration of the cylinder bore; motor drive means connected to said measuring probe and having said measuring sensors arranged at axial spacings from each other, each sensor having a respective sensing pin, said measuring head being advanceable in a measuring station to a workpiece receiving means, said measuring probe being insertable into said cylinder bore in the workpiece carried in said measuring station on the workpiece receiving means; said workpiece receiving means being resiliently seated in said measuring station during said measuring.

4,986,005

PLEAT PATTERN LAYOUT ASSEMBLY AND METHOD

Christopher P. Grippi, 20 Galli Dr. #5, Novato, Calif. 94949, and Vincent Grippi, 750 Liberty Rd., Petaluma, Calif. 94952

Filed Aug. 7, 1989, Ser. No. 390,203
Int. Cl.[5] G01B *3/14*; B05C *17/06*
U.S. Cl. 33—563 **13 Claims**



1. In a pounce template for stenciling a pleat layout pattern of pounce markings on a sheet of material to be pleated, said template having a plurality of apertures therein for the application of pounce therethrough to said workpiece and two edges oriented perpendicularly to each other, the improvement in said pounce template comprising:

said template being transparent and including ruler means proximate at least one of said two edges;

said apertures being positioned in said template in a plurality of rows, said rows being substantially parallel to each other and oriented in a known angular position relative to at least one of said two edges; and

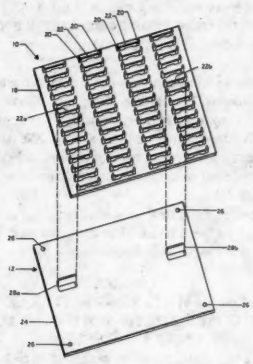
said pounce template carrying indexing means thereon provided by indicia proximate said two edges positioned in indexed relation relative to said rows of said apertures to enable said template to be moved over said workpiece between a plurality of relatively indexed positions to permit formation of said layout pattern by a combination of pounce markings at said plurality of relatively indexed positions.

4,986,006

APPARATUS FOR LOCATING A CONNECTOR PLATE OR THE LIKE

Austin S. Weaver, 6620 - 96th Ave., Zeeland, Mich. 49464

Filed Jan. 31, 1990, Ser. No. 473,277
Int. Cl.[5] F16B *15/00*; G01D *21/00*
U.S. Cl. 33—613 **10 Claims**



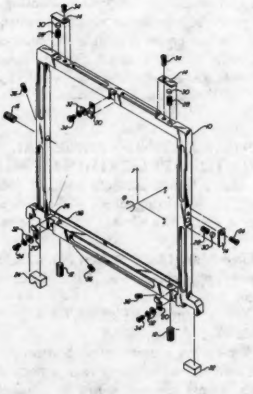
1. A locator means for accurately positioning a connector plate in a predetermined location on a jig for interconnecting a plurality of structural members to be assembled in the jig, the locator means comprising a base adapted to support the locator means on the jig and having mounting means for affixing the locator means to the jig, and retaining means provided on the base to cooperate with the connector plate to retain the connector plate in a predetermined position relative to the locator means during assembly of structural members in the jig.

4,986,007

RETICLE FRAME ASSEMBLY

Joseph L. Laganza, East Norwalk, and Orest Engelbrecht, Ridgefield, both of Conn., assignors to SVG Lithography Systems, Inc., Wilton, Conn.

Filed Mar. 25, 1987, Ser. No. 30,009
Int. Cl.[5] B41B *11/00*
U.S. Cl. 33—621 **9 Claims**



1. A reticle frame for precisely positioning and holding a

reticle in the X, Y and Z axis with a minimum of bending comprising:

a frame;

Z-axis alignment means, mounted on said frame, for positioning the reticle along the Z-axis;

Y-axis adjusting means, mounted on said frame, for adjustably positioning the reticle along the Y-axis;

a Y-axis axial loading spring, mounted on said frame opposite said Y-axis adjusting means, said Y-axis axial loading spring being transversely compliant when said reticle frame is holding said reticle thereby preventing distortion of said reticle;

X-axis adjusting means, mounted on said frame, for adjustably positioning the reticle along the X-axis;

a X-axis axial loading spring, mounted on said frame opposite said X-axis adjusting means, said X-axis axial loading spring being transversely compliant when said reticle frame is holding said reticle thereby preventing distortion of said reticle; and

reference means, attached to said frame, for referencing said frame with respect to an alignment fixture.

4,986,008

METHOD FOR DEWATERING WATER-CONTAINING PARTICLE COLLECTIONS WITH THE AID OF GAS UNDER PRESSURE

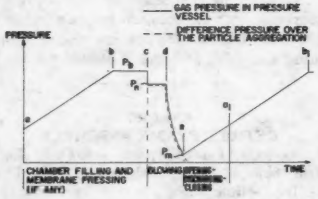
Thomas S. A. Falk, Sala, Sweden, assignor to Sala International AB, Sala, Sweden

Filed Jun. 6, 1989, Ser. No. 362,011

Claims priority, application Sweden, Jun. 7, 1988, 8802110

Int. Cl.[5] F28B *5/04*

U.S. Cl. 34—15 **7 Claims**


GAS PRESSURE IN PRESSURE VESSEL
DIFFERENCE PRESSURE OVER THE PARTICLE AGGREGATION
PRESSURE
TIME
CHAMBER FILLING AND MEMBRANE PRESSING (IF ANY)

1. A method for dewatering a water-containing particle collection by pressurized gas which includes a dewatering stage in which said pressurized gas imparts a pressure difference through and across the particle collection, wherein said pressure difference is a predetermined pressure difference of about at least 1 atmosphere which is maintained over a time period which only slightly exceeds the amount of time which is required for the gas to penetrate the particle collection.

4,986,009

PROCESS FOR DRYING A MATERIAL WEB AND DEVICE FOR THE APPLICATION OF THE PROCESS

Winfried Haessner; Georg Kugler, both of Heidenheim, and Robert Wolf, Herbrechtingen, all of Fed. Rep. of Germany, assignors to J. M. Voith GmbH, Heidenheim, Fed. Rep. of Germany

Filed Mar. 10, 1989, Ser. No. 321,761

Claims priority, application Fed. Rep. of Germany, Mar. 10, 1988, 3807856

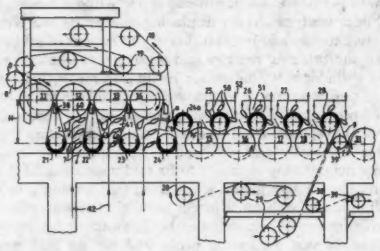
Int. Cl.[5] F26B *3/00*

U.S. Cl. 34—23 **26 Claims**

1. Process for drying a material web comprising:

passing the material web, along with a porous backing belt, alternately across contact zones on heatable rolls which are contacted by the material web and across the guide rolls which are contacted by the backing belt such that a free web surface exists in a section of web travel contained between adjacent contact zones;

supplying drying air from outside each contact zone to the free web surface in drying air blow zones which in the direction of web travel are relatively narrow, with the drying air blow zones alternating in the direction of web



travel with steam release spaces which in the direction of web travel are relatively wide, with the ratio of the length of each drying air blow zone to the length of each steam release space being maximally 1/20, such that the material web outside the contact zones repeatedly and alternately passes by drying air blow zones and steam release spaces.

4,986,010

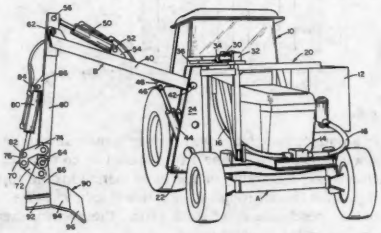
SLOPER APPARATUS

Jack O. Cartner, 1005 N. 8th St., Cambridge, Ohio 43725

Filed Mar. 13, 1989, Ser. No. 322,631

Int. Cl.[5] E02F *5/00*

U.S. Cl. 37—108 R **27 Claims**



24. A mobile sloping apparatus comprising:

a prime mover;

an arm assembly operatively connected at a first end to said prime mover; and,

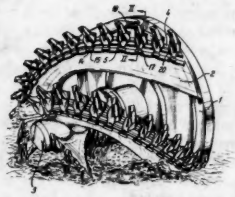
a planar sloper blade operatively connected, at a first end, to a second end of said arm assembly, wherein said sloper blade extends in a plane generally normal to a longitudinal axis of said arm assembly and wherein said sloper blade includes a second end, which is adapted to contact an associated ground surface, wherein said sloper blade second end is located at an obtuse angle in relation to said sloper blade first end.

4,986,011

CUTTING DEVICE WITH REMOVABLE TOOLS

Aldert J. M. van Hemmen; Cornelis M. P. Wempe, and Martinus A. Balm, all of Spaarndam, Netherlands, assignors to Stapel B.V., Netherlands

Filed Apr. 17, 1989, Ser. No. 339,118
Int. Cl.[5] E02F *9/28*
U.S. Cl. 37—141 T **7 Claims**



1. Cutting device having at least one part with an edge provided with a plurality of replaceably cutting tools, each of which are individually mounted upon said edge by means of detachably connecting elements, the improvement comprising:

the outer part of each edge having tapering side faces which extend towards a common imaginary section line outside said side faces, which side faces terminate short of said section line,

the cutting tools having an integral body which is generally V-shaped with a short leg and a long leg with the inner faces of said legs extending at substantially the same angle with respect to each other as the angle of the taper of the side faces of said edge part,

said cutting tools being directly mounted with the inner faces of said legs upon the tapering side faces of the said edge,

said edge part having a plurality of integral supports spaced apart along the length of said edge part at a distance from the edge thereof, each having an opening or recess,

each long leg having at its end a lip portion which extends into the opening or recess of one of said integral supports,

the shape of the inner face of the long leg of each tool body and the opposing face of the edge part being such that a space is formed therebetween, said space being positioned between the support and the tapering side faces of the edge part so that a deformable element can be placed in said space in a direction which is substantially parallel to the edge of said edge part.

4,986,012

RETRACTABLE DRIFT CUTTER

David S. Majkrzak, West Fargo, N. Dak., assignor to Crary Company, Fargo, N. Dak.

Filed Oct. 23, 1989, Ser. No. 425,695
Int. Cl.[5] E01H *5/09*
U.S. Cl. 37—248 **9 Claims**

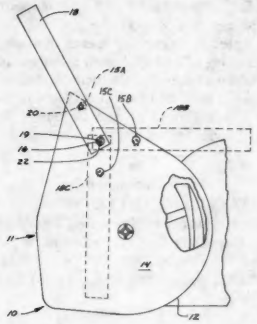
1. A snow removal apparatus, having a drift cutter arm that is fastened to and extends up from a housing, wherein the improvement comprises:

means for fastening the drift cutter arm to the housing which allows the drift cutter arm to be locked in a working position and retracted to a storage position while the drift cutter arm remains fastened to the housing, said fastening means comprising:

pivot pin means which fastens one end of the drift cutter arm to the housing and allows the drift cutter arm to pivotally move to the storage position;

a releasable lock pin cooperating between the drift cutter arm and the housing which releasably holds the drift cutter arm in a rigid working position; and

the pivot pin means resiliently mounting the drift cutter arm to the housing so that a free end of the drift cutter arm can be moved outwardly and released from a



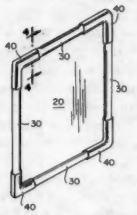
locked position adjacent the housing and rotated to its storage position.

4,986,013

POSTER FRAME

Ronald M. Pollack, 73-19 37th Road, Jackson Heights, N.Y. 11372

Filed Mar. 29, 1990, Ser. No. 502,115
Int. Cl.[5] A47G *1/06*
U.S. Cl. 40—152 **23 Claims**



1. A frame for a poster comprising:

at least one edge support for an edge of said poster, said edge support extending substantially the length of said poster edge and including an inverted generally T-shaped back plate extending the length thereof, having a base leg and an upstanding leg disposed generally, normally to said base leg and having a first end interconnected, generally centrally of said base leg and a second end, and a generally C-shaped dome member having a center section interconnected with said second end of said upstanding leg of said back plate and two curved legs, each of which extend toward opposite ends of said base leg of said base plate to define a gap between the ends of said curved legs and said base leg for the purpose of receiving the respective edge of said poster; and

at least one fastening element associated with said edge support for fastening said poster edge thereto, said at least one fastening element having first and second legs and being substantially C-shaped to overlay the C-shaped member of said edge support and engage therewith with a snap fit, said legs of said fastening element extending beyond the ends of said curved legs of said C-shaped dome member and toward said base leg of said base plate, to press the poster edge against said base leg to thereby fasten the same and provide a stiffer frame, said C-shaped fastening element having inwardly directed engagement

cams at the ends of said first and second legs thereof, the engagement cam of said first leg being adapted to engage by means of a snap fit the end of the first leg of said C-shaped dome member of said edge support, and the engagement cam of said second leg of said fastening element being adapted to engage by means of a snap fit the end of said second leg of said C-shaped dome member and so that a wedge-like connection is formed at both sides of said edge support with said fastening element, thereby improving the gripping hold of said fastening element and improving the rigidity of the structure.

4,986,014

MATRIX-TYPE ADVERTISING DEVICE

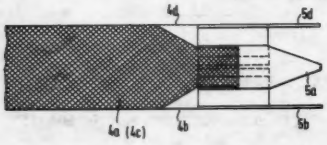
Gerhard-Gunter Gassmann, Neuweiler, Fed. Rep. of Germany, assignor to Gassmann GmbH, Fed. Rep. of Germany

Filed Feb. 8, 1989, Ser. No. 308,317

Claims priority, application Fed. Rep. of Germany, Feb. 8, 1988, 3803715

Int. Cl.[5] G09F *11/12*

U.S. Cl. 40—472 **22 Claims**



1. In a matrix-type advertising device with a circulating transport unit having flap-like advertising elements positioned in rows and columns connected with a transport band on one side, proceeding in a direction of transport, further having dividing strips positioned in an advertising area, the dividing strips coordinated with individual rows having a color contrasting with a transport band of the advertising elements, the advertising elements in front of or behind the assigned dividing strips capable of being brought into an advertising position, the improvement comprising;

said dividing strips (4) constructed as flexible bands, said flap-like advertising elements (3, 3') positioned against one another whereby edges of a flexible said dividing strip (4) proceeding in a direction of transport are conducted within and supported by said transport band (1).

4,986,015

DEVICE FOR THE CYCLIC REARRANGEMENT OF A PILE OF RECTANGULAR OF SQUARE SHEETS

Peter Ackeret, Kusnacht, Switzerland, assignor to Licinvest AG, Chur, Switzerland

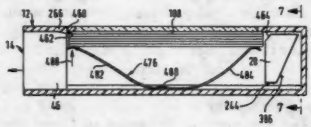
Continuation of Ser. No. 901,533, Jul. 11, 1986, Pat. No. 4,754,564. This application Jun. 29, 1988, Ser. No. 212,972

Claims priority, application Fed. Rep. of Germany, Nov. 13, 1984, 3441454

The portion of the term of this patent subsequent to Oct. 15, 2002, has been disclaimed.

Int. Cl.[5] G09F *11/30*

U.S. Cl. 40—511 **27 Claims**



1. An apparatus for cyclic rearrangement of a stack of substantially rectangular sheets, in particular photographic prints, comprising:

a first frame part,

a second frame part reciprocable relative to said first frame part in a predetermined direction between an inner end position and an outer end position, and

means for removing an individual sheet from one end of said stack leaving a stack remainder and for adding said individual sheet to the other end of the stack remainder upon each reciprocation, said means including

means for separating said individual sheet from said stack,

means for feeding sheets to said separating means,

first means for retaining said individual sheet in said first frame part and second means for retaining said stack remainder in said second frame part, and

means for transferring said separated individual sheet from one stack end to the other stack end, wherein said first retaining means includes a transporter engaging a transverse edge of said individual sheet, the apparatus further comprising means for urging said transporter in engagement with said sheet edge, said urging means engaging said other stack end so as to maintain said transporter engagement over at a least a predetermined portion of a relative frame part movement from said inner end position towards said outer end position, said urging means being deactivated over the same predetermined movement portion from said outer end position towards said inner end position so as to clear a passage for returning said separated individual sheet to said other stack end.

4,986,016

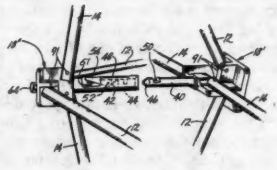
FOLDING DISPLAY FRAME WITH OFFSET HUB CONFIGURATION

William J. Wichman, 702 Brownsage Dr., Glendora, Calif. 91740

Continuation-in-part of Ser. No. 940,019, Dec. 10, 1986. This application Nov. 3, 1989, Ser. No. 431,469

Int. Cl.[5] G09F *15/00*

U.S. Cl. 40—610 **34 Claims**



1. A folding framework for use as a folding display frame movable between an open expanded position forming a three-dimensional array of cubicles in a display-supporting frame and a compact closed form for storage, the framework comprising:

a plurality of pairs of rods, each pair of rods being pivotally joined to each other at an intermediate point;

a plurality of hubs, the respective ends of each rod being pivotally joined to corresponding ones of said hubs, each hub having a plurality of said rods pivotally joined thereto;

the pivotal connection of each rod to a hub providing rotation of the rod relative to the hub about a corresponding single axis of revolution;

rods connected to any one hub being rotatable about said single axis of revolution from a closed position in which all the rods are substantially parallel to each other to an open position in which the rods radiate outwardly from each other;

each hub having a base plate with fixed flanges projecting therefrom for pivotally supporting a first pair of said rods secured to a corresponding first pair of said flanges on opposite sides of a central axis of the hub and a second pair of said rods pivotally connected to a corresponding sec-

ond pair of said flanges on opposite sides of the central axis of the hub, said second flanges extending substantially perpendicularly to said first flanges;

the pair of first flanges having corresponding fixed first bearing surfaces lying substantially on a first axis passing essentially through the central axis of the hub, the pair of second flanges having corresponding fixed second bearing surfaces lying substantially on a second axis passing essentially through the central axis of the hub and extending substantially perpendicularly to said first axis;

the ends of the first rods pivotally secured to said first bearing surfaces being rotatable thereon about spaced apart fixed axes of revolution extending substantially parallel to each other and lying substantially in a first plane, the ends of the second rods pivotally secured to said second bearing surfaces being rotatable thereon about spaced apart fixed axes of revolution extending substantially parallel to each other and lying substantially in a second plane which is spaced outwardly from the base plate by an offset distance greater than said first plane and which lies substantially parallel to the first plane.

4,986,017

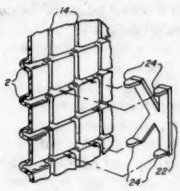
SIGN BOARD

Ronald P. Eckert, Prospect Heights, Ill., assignor to Thomas A. Schutz Co., Inc., Morton Grove, Ill.

Filed Oct. 30, 1989, Ser. No. 429,046

Int. Cl.[5] G09F *7/06*

U.S. Cl. 40—622 **3 Claims**



1. A sign board for a message and display fixture comprising:

a plastic board having a first series of regularly spaced parallel grooves, and a second series of regularly spaced parallel grooves, said first series of said grooves being perpendicular to said second series of grooves and intersecting therewith, whereby an area of said plastic board encompassing said first and said second series of grooves defines a message panel, said plastic board further comprising a display panel positioned adjacent said first and said second series of grooves, whereby an illustration or suitable graphic may be carried by said display panel in conjunction with said message panel, and whereby said message panel and said display panel adjacently define a display face within said plastic board; and

a plurality of letter blocks to be received by said first or said second series of grooves, said blocks including means for slidable engagement with either of said first or said second series of said grooves to permit the horizontal or vertical sliding of the letter blocks within the grooves and such that disorientation of said plastic board will not disturb the position of the letter blocks contained therein.

4,986,018

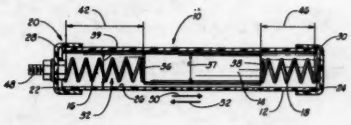
STABILIZER FOR REDUCING THE EFFECT RESULTING FROM FIRING A FIRING WEAPON

Norman J. McDonald, Jr., Rt. 1, Box 155, Hendrix, Okla. 74741

Filed Feb. 27, 1987, Ser. No. 19,708

Int. Cl.[5] F41C *27/22*

U.S. Cl. 42—1.06 **3 Claims**



1. A stabilizer for use with a bow to reduce the effect resulting from firing such bow, comprising:

a tube having a first end and a second end and a tube opening extending a distance therethrough generally between the first and the second ends thereof, a hydraulic fluid being disposed within and substantially filling the tube opening;

closure means for substantially closing the tube opening generally at the first and the second ends of the tube for cooperating to retain the hydraulic fluid within the tube opening;

a piston disposed in the tube opening and having opposite ends, the piston being movable in a first direction generally from the first end toward the second end of the tube and in a second direction generally from the second end toward the first end of the tube, the tube being constructed of a non-metallic plastic material for reducing noise during the operation of the stabilizer;

a first spring disposed within the tube opening having one end engageable with one end of the piston and an opposite end engagable with a portion of the closure means closing the tuber opening generally at the first end of the tube, the first spring being a metal, coil type spring coated with a plastic material for further reducing noise during the operation of the stabilizer;

a second spring disposed within the opening having one end engagable with one end of the piston, opposite the end engagable with the first spring, and an opposite end engagable with a portion of the closure means closing the tube opening generally at the second end of the tube and, the second spring being a metal, coil type spring coated with a plastic material for further reducing noise during the operation of the stabilizer;

means for removably securing the tube to the bow.

4,986,019

INDUSTRIAL SHOTGUN

William G. Dennis, Jr., Florissant, Mo., assignor to Olin Corporation, Stamford, Conn.

Filed Oct. 30, 1989, Ser. No. 429,259

Int. Cl.[5] F41A *17/00, 19/00*

U.S. Cl. 42—69.01 **15 Claims**

1. A heavy recoil industrial gun for removing residue from heated equipment, said gun comprising:

a frame having a forward end and an opposite aft end;

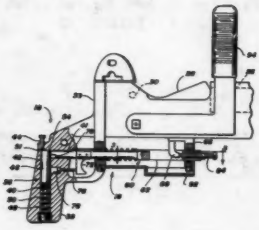
a hanging means for vertically suspending said gun in a balanced condition;

a barrel having a muzzle end and a breech end attached to the forward end of said frame, said breech end of said barrel and said frame forming a firing chamber therethrough for receiving a cartridge therein;

a breech block movably supported in said frame movable between a closed position closing said firing chamber and an open position;

a hand grip assembly attached to said aft end of said frame for maneuvering and aiming said barrel of said gun into said heated equipment;

a trigger means operably coupled to said breech block for firing said cartridge when said block is in said closed position; and



a remote trigger mechanism spaced from said trigger means and said breech block, said mechanism being slidably supported by said hand grip assembly and adapted to be operably coupled with said trigger means only when said breech block is closed.

4,986,020

FISHING FLY FLOATING AGENT AND PREPARATION THEREOF

Paul Maruca, P.O. Box 132, Errol, N.H. 03579

Filed Apr. 16, 1990, Ser. No. 509,194
Int. Cl.[5] A01K *69/00*
U.S. Cl. 43—4 **1 Claim**

1. A method of treating fishing flies and the like to enable them to float on the surface of water, comprising the steps of:

placing one ounce of liquid 1,1,1-trichloroethane in a container;

adding an eighth of an ounce of silicone in a wax base into said container;

mixing the above-identified mixture in said container until said silicone is dissolved;

dipping the fishing fly to be treated into said mixture;

allowing said mixture to be in contact with said fishing fly for a period of time;

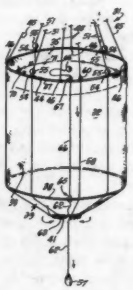
withdrawing said fishing fly from said container; and allowing said fishing fly to dry to the touch.

4,986,021

FISH NET AND METHOD OF CAPTURING FISH

Kent R. Thomas, 14228 Erwin St., #1, Van Nuys, Calif. 91401

Filed Dec. 27, 1988, Ser. No. 289,693
Int. Cl.[5] A01K *73/12*
U.S. Cl. 43—14 **42 Claims**



1. A method of capturing one or more fish found in a depth of water comprising

providing an apparatus with a net assembly having an upper end and a lower end and first and second rings mounted to said net so that they are in spaced relation to one another in operation of the apparatus and with skirt means mounted to the first of said rings, the lower end of said apparatus having a closable bottom,

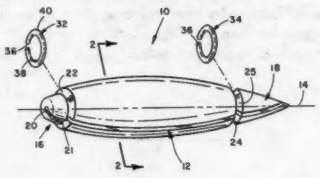
hovering over the fish with said apparatus, and enveloping the fish in the water through said bottom, whereby the enveloped fish do not escape through said bottom upon operation of the apparatus.

4,986,022

DEVICE FOR RETRIEVING FISHING EQUIPMENT

James D. Wilkinson, R.R. 5, Box 183, Muncie, Ind. 47302

Filed Mar. 7, 1990, Ser. No. 489,513
Int. Cl.[5] A01K *97/00*
U.S. Cl. 43—17.2 **4 Claims**



1. A fishing equipment retriever comprising:

A) a monolithic body formed of heavy metal and which includes

(1) a forward end portion,

(2) a rear end portion,

(3) a body connecting said forward end portion to said rear end portion, said body having an outer periphery which is curved,

(4) said forward end portion and said rear end portion each having an outer peripheral shape of a tangent ogive and forming a smooth continuation of the curved outer periphery of said monolithic body,

(5) a longitudinal axis extending from said forard end portion to said rear end portion,

(6) a bore extending along said longitudinal axis,

(7) a slot defined through said body and through said end portions and intersecting said bore,

(8) a forward groove defined in said body adjacent to said forward end portion and having a maximum outer diameter located adjacent to said body and a minimum outer diameter located adjacent to said forward end portion and an inner diameter located between said minimum outer diameter and said maximum outer diameter,

(9) a rear groove defined in said body adjacent to said rear end portion and having a maximum outer diameter located adjacent to said body and a minimum outer diameter located adjacent to said rear end portion and an inner diameter located between said minimum outer diameter and said maximum;

B) a forward annular lock ring located in said forward groove, said forward lock ring including

(1) a slot defined therethrough

(2) an inner surface having a diameter essentially equal to said forward groove inner diameter,

(3) an outer surface which is curved in two planes to have

(a) a rear portion located adjacent to said body when said forward lock ring is in said forward groove, said forward lock ring rear portion having a first radius of curvature, and

(b) a forward portion located adjacent to said forward end portion when said forward lock ring is in said forward groove, said forward lock ring forward portion having a second radius of curvature that is different from said forward lock ring outer surface first radius of curvature

so that said forward lock ring outer surface slopes from said forward lock ring forward portion towards said forward lock ring rear portion and forms a curve that matches the smooth curvature of the outer periphery of said monolithic body when said forward lock ring is in said forward groove; and

C) a rear annular lock ring located in said rear groove, said rear lock ring including

(1) a slot defined therethrough,

(2) an inner surface having a diameter essentially equal to said rear groove inner diameter,

(3) an outer surface which is curved in two planes to have

(a) a forward portion located adjacent to said body when said rear lock ring is in said rear groove, said rear lock ring outer surface forward portion having a first radius of curvature, and

(b) a rear portion located adjacent to said rear end portion when said rear lock ring is located in said rear groove, said rear lock ring outer surface rear portion having a second radius of curvature that is different from said rear lock ring outer surface first radius of curvature so that said rear lock ring outer surface slopes from said rear lock ring rear portion towards said rear lock ring front portion and forms a curve that matches the smooth curvature of the outer periphery of said monolithic body when said rear lock ring is in said rear groove;

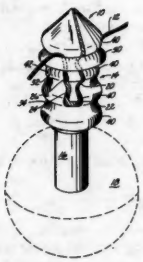
D) said smooth curvature being essentially uninterrupted from a forwardmost location on said forward end portion to a rearwardmost location on said rear end portion.

4,986,023

LINE TIE

Frederick S. Bucholz, Omaha, Nebr., assignor to Plastilite Corporation, Omaha, Nebr.

Filed Mar. 30, 1990, Ser. No. 501,467
Int. Cl.[5] A01K *91/00*
U.S. Cl. 43—44.87 **10 Claims**



1. A line tie, comprising:

a cylindrical body including a top portion and a base, said base being connected to an attached member;

said top portion including an axial slot disposed to receive a section of line, said slot extending downwardly from and through said top portion toward said base and including: a downwardly directed line-loading section; an upwardly directed securement section in open communication therewith, said securement section terminating in a closed end; and, a transition section that interconnects said line loading section and said securement section

a plurality of axially spaced annular grooves formed in the periphery of said top portion including a set groove disposed above said closed end of the securement section, a slip groove disposed intermediate the ends of the securement section, and a line loading groove disposed below the securement section; and

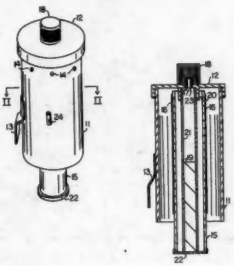
a resilient ring disposed to be selectively received in one of said grooves.

4,986,024

INSECT TRAP

Thomas W. Peek, and John B. Floyd, both of Ocala, Fla., assignors to Bio-AgriTech, Inc., Jacksonville, Fla.

Filed Oct. 19, 1989, Ser. No. 424,151
Int. Cl.[5] A01M *1/20*
U.S. Cl. 43—107 **12 Claims**



1. An insect trap using an attractant means to attract the insects and a poison means to kill the insects comprising:

(A) a housing having an open upper end and an open bottom end;

(B) a removable cap member adapted to fit onto said open upper end of said housing, said cap member having a relatively small aperture, a vent tube extending upwardly from said aperture, a vent screen enclosing said vent tube, and a receptacle receiving member;

(C) attractant means which diffuses into the surrounding atmosphere for attracting insects and poison means for killing insects;

(D) a receptacle member for holding said attractant means having an open upper end adapted to be attached to said receptacle receiving member, a closed relatively long main body and a closed bottom end having a flanged seat for retaining a poison sleeve;

(E) a poison sleeve surrounding the main body of said receptacle member and retained within said flanged seat, where said poison means is attached to the exterior of said poison sleeve;

(F) where said receptacle receiving member closes said open end of said receptacle member and said vent tube is the only exit means for said attractant means to diffuse from said receptacle member into the atmosphere.

4,986,025

LANDSCAPE APPARATUS

William A. Imperial, 1039 Houghton Ct., San Jose, Calif. 95112

Filed Jan. 25, 1990, Ser. No. 470,363
Int. Cl.[5] A01G *13/02*
U.S. Cl. 47—2 **2 Claims**

1. A landscape apparatus comprising,

a series of equally configured, pie-shaped segments, each of the segments including a floor and a perimeter wall portion orthogonally and integrally fixed to the floor about a perimeter defined by the floor, and

the perimeter wall portion including a forward arcuate concave wall, spaced planar side walls, and a rear arcuate convex wall, and

securement means formed to each side wall to secure the segments together, and

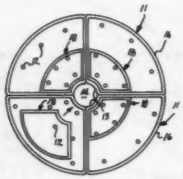
wherein the securement means includes a plurality of spaced lug members formed on one of the planar side walls, and a plurality of spaced keyhole apertures formed in the other

of the side walls of each of the segments, wherein each of the respective lug members are received within a respective keyhole shaped aperture within an adjacent pie-shaped segment, and

wherein the segments, when secured in a first position, define a central cylinder defined by the forward arcuate concave walls of each of the segments, and

wherein the floor of each of the segments includes a matrix of apertures therethrough, and

wherein each of the pie-shaped segments includes a pie-shaped container segment of complementary configura-



tion defined by a forward portion of each of the pie-shaped segments, wherein the pie-shaped segments are each defined by a first radius and each of the pie-shaped container segments are defined by a second radius equally to substantially half a dimension defined by the first radius, and each of the pie-shaped container segments are defined by a container segment wall defined by a second height, and wherein the perimeter wall of each of the pie-shaped segments are defined by a first height, wherein the second height is substantially greater than that defined by the first height.

4,986,026

ALTERNATIVE METHOD FOR PRODUCING TALL FESCUE SOD

Henry F. Decker, 4751 Stover Rd., Ostrander, Ohio 43061

Filed Jul. 27, 1988, Ser. No. 224,939

Int. Cl.[5] A01C *1/04*

U.S. Cl. 47—56 **11 Claims**

1. A method for producing a tall fescue sod having substantially less weight than conventional sod in the absence of bluegrass or sod netting comprising:

placing whole culm wheat straw to a depth range of one to two inches over a solid base; adding composted sludge in the range of 30–40 cubic yards per acre so as to fill the voids an interstices of the culms; seeding with suitable tall fescue cultivans; allowing both the unharvested wheat seed and tall fescue seed to germinate wherein a vigorous primary root growth systems of the tall fescue and wheat combine to knit the straw and growing medium into a sod of at least one-half inch thickness and then harvesting the resulting tall fescue sod.

4,986,027

HYDROPONIC GROWTH SYSTEM

Roy Harvey, R.R. 5 Poleline Road, Thunder Bay, Ontario, Canada P7C 5M9

Continuation of Ser. No. 916,119, Oct. 6, 1986, abandoned. This application Jun. 14, 1988, Ser. No. 206,619

Claims priority, application Canada, Nov. 15, 1985, 495436

Int. Cl.[5] A01G *31/00*

U.S. Cl. 47—59 **15 Claims**

1. A structure for supporting the growth of plants, said structure comprising:

a collapsible flexible woven fabric tubular element having a perforate wall and first and second ends;

(i) said perforate wall having slits therein;

(ii) said structure including fibrous plugs adjacent said slits for supporting roots of plants which may grow through said slits and for retaining material within said structure;

(b) closure means operably positioned for expanding said tubular element and defining within said tubular element an elongate enclosed volume; said closure means comprising first and second perforate rigid disc members;

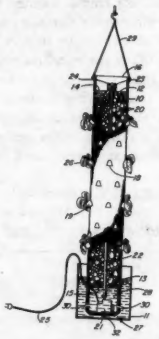
(i) said first disc member being operably mounted in, and spaced from, said first end of said tubular element; and,

(ii) said second disc member being operably mounted in, and spaced from, said second end of said tubular element;

(c) fluid and rot permeable material filling said elongate enclosed volume, for supporting the roots of the plants;

(d) seal means for enclosing said tubular element second end;

(e) suspension means constructed and arranged for vertical suspension and said tubular element by said first end; and



(f) means for supplying a fluid nutrient to the fluid and root permeable material; said means for supplying fluid nutrient including: a conduit element operably attached to a pump means located proximate said second end, said conduit element extending to a conduit mouth above said fluid and root permeable material; and pump means for transporting fluid nutrient upwardly through said conduit element and outwardly from said conduit mouth at a location substantially adjacent said tubular element first end, wherein said first disc member, said tubular element and said fluid and root permeable material direct fluid flow downwardly through said fluid and root permeable material to substantially adjacent said tubular element second end.

4,986,028

MOUNTING BRACKET

Alfred Schneider, Kreuztal, and Michael Zimmerman, Siegen, both of Fed. Rep. of Germany, assignors to Siegenia-Frank KG, Siegen, Fed. Rep. of Germany

Filed Jun. 5, 1990, Ser. No. 533,589

Claims priority, application Fed. Rep. of Germany, Jun. 19, 1989, 3919970; Oct. 19, 1989, 8912421[U]; Feb. 13, 1990, 9001629[U]

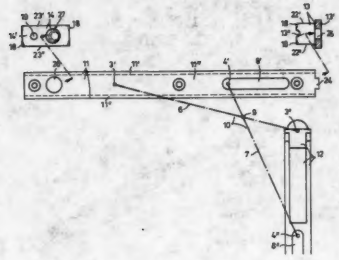
Int. Cl.[5] E05D *15/28*

U.S. Cl. 49—248 **12 Claims**

1. A mounting bracket (**10**) for the wings (**2**) of windows, doors, and the like, consisting of a bearing rail (**11**) secured in a groove surface (**1'**) on a fixed frame side and a holding rail (**12**) on a groove surface of a wing, and two guides (**6** and **7**), each of which is connected at one end to the bearing rail (**11**) and at the other end to the holding rail (**12**) in a manner which allows a swiveling motion at the joints (**3'**; **4'/8'** or **3''**; **4''/8''**) formed by each connection,

characterized by the fact that the bearing rail (**11**) is connected to the frame by a plug-type connection (**24**, **25** and

26, 27) to bases (13 and 14) mounted on the peripheral groove surface (1') of the fixed frame (1) by a detachable



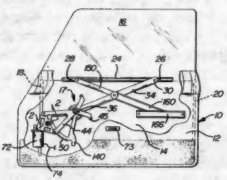
and interlocking structure by means of a reversible lock (26, 27''') which holds the rail against these bases (13 and 14) in a contact position.

4,986,029

WINDOW REGULATOR FOR VEHICLE DOORS

Herbert A. Richter, Walled Lake, Mich., assignor to Wickes Manufacturing Company, Southfield, Mich.

Filed Mar. 19, 1990, Ser. No. 495,486
Int. Cl.[5] E05F 11/44
U.S. Cl. 49—349 8 Claims



1. A regulator assembly for moving a window panel to selected stations between first and second limits comprising cooperating gear and lever means for moving said window panel with respect to a door of a vehicle, power unit means associated with said gear and lever means for powering said window to said selected stations, support bracket means for said power unit means and said gear and lever means, the improvement comprising inner mount isolator means operatively disposed between said power unit means and said support bracket means of a plastics material effective to isolate said power unit means from said gear and lever means and from said support bracket means while providing low friction contact means for slidably supporting said gear means and to provide a cushioning stop to limit travel of said gear means in moving said window panel to at least one of said limits.

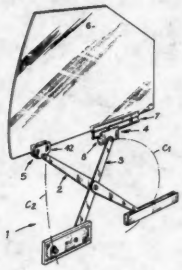
4,986,030

DEVICE FOR A SLIDING COUPLING BETWEEN A WINDOW AND A WINDOW-RAISER MECHANISM IN A VEHICLE

Carlo Bertolini, Paris, and Philippe Becerril, Darvoy, both of France, assignors to Rockwell-CIM, France

Filed Sep. 25, 1989, Ser. No. 411,754
Claims priority, application France, Sep. 29, 1988, 88 12760
Int. Cl.[5] E05F 11/44
U.S. Cl. 49—351 7 Claims

1. A coupling device between a window (6) and a window-raiser mechanism (2) in a motor vehicle, comprising: in combination, first and second matching sections (7, 8), said first section (7) being capable of being fastened to the bottom of the window (6), said second section (8) being adapted to be articulated on an arm (3) of the window raiser, and the cross-sections of said first and second sections are such that the first section (7) is movable into locking relation internally of a groove in the second section (8) by displacement of said first section and said window substantially in the general plane of the window (6)



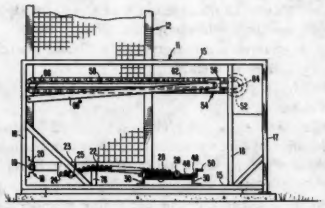
and snapping the first section in a retained position internally of said groove, with the cross-sections of said first and second sections (7, 8) providing translational motion between said first and second sections along a longitudinal axis of one of said members and a degree of relative rotation between said members about an axis parallel to said longitudinal axis.

4,986,031

GATE ASSEMBLY

Colvin H. Agnew, Billings, Mont.; Weldon O. Wade, Alamogordo, and Stuart H. Agnew, Albuquerque, both of N. Mex., assignors to W & A Enterprises, Alamogordo, N. Mex.

Filed Jan. 9, 1987, Ser. No. 1,847
Int. Cl.[5] E05D 7/00
U.S. Cl. 49—385 11 Claims



1. A gate assembly comprising:

a gate;

a support for said gate, said gate being movable relative to said support between a closed position, in which said gate is generally horizontal, and an open position, in which said gate is generally vertical;

means for biasing said gate toward the open position, said biasing means exerting a force on said gate insufficient to independently move said gate to the open position; and

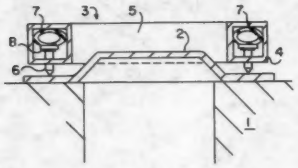
means for inducing a return bias in said biasing means when said gate is near the open position,

said return bias inducing means also comprising means for contacting said gate to support said gate in a precisely vertical orientation when said gate is in the open position.

4,986,032
DOOR

Klaus Wessiepe, Essen, and Wilhelm Stewen, Oberhausen, both of Fed. Rep. of Germany, assignors to Ruhrkohle AG, Essen, Fed. Rep. of Germany

Continuation of Ser. No. 285,837, Dec. 15, 1988, abandoned.
This application Apr. 10, 1990, Ser. No. 508,493
Int. Cl.[5] E06B 7/16
U.S. Cl. 49—477 14 Claims



1. A coke oven door assembly for substantially closing a coke oven door opening and for compensating for uneven surfaces of the coke oven door opening, said coke oven door assembly comprising:

a sealing element for being disposed adjacent to an outer surface of the periphery of said coke oven door opening, and substantially closing said coke oven door opening; and

frame member means for being disposed about and adjacent to an outer surface of the periphery of said coke oven door opening;

said frame member means comprising inflatable means and a plurality of force generating means for applying a plurality of forces to said sealing element about the periphery of said coke oven door opening;

said inflatable means being disposed to extend said plurality of force generating means adjacent said sealing element at a plurality of points for pressing said sealing element against the periphery of said coke oven door opening;

said sealing element comprising a light weight shield;

said light weight shield comprising sheet metal;

said frame member means comprising a hollow profile frame having at least one end;

said inflatable means being disposed within said hollow profile frame;

said inflatable means comprising at least one inflatable hose;

said plurality of force generating means comprising slidable tappets for sliding back and forth within said frame means;

said slidable tappets comprising elongated cylindrical elements disposed in holes in said frame member means;

said tappets including head means in contact with said at least one inflatable hose;

said at least one inflatable hose applying substantially equal force to all of said slidable tappets;

said at least one inflatable hose is configured to receive a coolant therein;

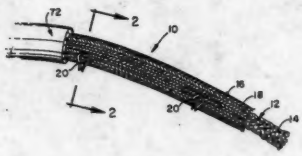
said at least one inflatable hose is positioned at the end of said frame that is farthest away from said coke oven door opening; and

said tappets are interposed between said at least one inflatable hose and said sealing element to maintain a sufficient separation between said at least one inflatable hose and said coke oven door opening to minimize heat transfer from said coke oven door opening to said at least one inflatable hose.

4,986,033
GASKETS AND GASKET-LIKE DEVICES WITH FASTENERS

Thomas L. Weil, Elverson, Pa., assignor to Davlyn Manufacturing Co., Inc., Spring City, Pa.

Filed Oct. 16, 1987, Ser. No. 109,809
Int. Cl.[5] E06B 7/16
U.S. Cl. 49—492 6 Claims



1. A method of making an elongated gasket-like device with at least a plurality of spaced fasteners, each fastener including a base and an engagement portion extending transversely from the base, comprising the steps of:

weaving an outer jacket of weavable elements around an elongated core; and

inserting separate, unconnected, individual fasteners between the core and the weavable elements being woven around the core with the engagement portion of each fastener facing away from the core and towards the weavable elements, the weavable elements capturing the base of each inserted fastener against the core between adjoining portions of the core and the outer jacket being woven wherein each fastener base is irremovably retained between the adjoining portions of the core and outer jacket with the engagement portion of each fastener protruding outwardly through the woven elements of the adjoining portion of the outer jacket.

4,986,034
ADJUSTABLE DOOR FRAME ASSEMBLY

Gary Mozuras, Mt. Clemens; Dennis Perliski, Sterling Heights, and Robert C. Carnick, Warren, all of Mich., assignors to Copco Door Company, Warren, Mich.

Continuation of Ser. No. 104,780, Oct. 5, 1987, Pat. No. 4,912,879. This application Feb. 26, 1990, Ser. No. 484,917
The portion of the term of this patent subsequent to Apr. 3, 2007, has been disclaimed.
Int. Cl.[5] E06B 1/60
U.S. Cl. 49—505 18 Claims

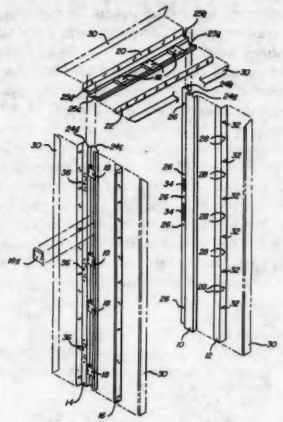
1. A frame assembly adapted to be fitted into an opening in a wall, said assembly including:

a frame member elongated along a longitudinal axis thereof and having a generally planar interior surface adapted to be supported by, and cover a portion of the interior periphery of the opening, and an exterior surface disposed distal said interior periphery, the frame member further including a hat portion defining a raised channel extending along the longitudinal axis of the member, said channel being substantially open proximate the interior surface and including a jamb hook portion comprising a flange which is generally coplanar with the interior surface of the frame member;

at least one resilient clip member configured to include a clip hook portion operative to engage the jamb hook so as to support the clip member in the raised channel without affixation to said wall, said clip member further including a tongue portion; and

a generally planar trim piece of substantially the same length as the frame member, said trim piece having a first portion adapted to be slidably retained by contact with the tongue portion of said clip and a second portion adapted to cover at least a portion of the interior periphery of said opening

not covered by the frame member, whereby sliding of the trim piece in the clip permits the frame assembly to be



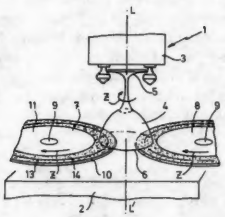
expanded to accommodate the differing interior peripheries associated with various thicknesses of walls.

4,986,035

GRINDING WHEEL FOR THE SMOOTHING AND POLISHING OF GLASSES

Honoré J. Lambot, Wauthier-Braine, Belgium, assignor to Diamant Boart Societe Anonyme, Brussels, Belgium

Continuation of Ser. No. 149,997, Jan. 27, 1988, abandoned, which is a continuation of Ser. No. 831,690, Feb. 21, 1986, abandoned. This application Mar. 3, 1989, Ser. No. 318,530
Claims priority, application Belgium, Feb. 28, 1985, 214578
Int. Cl.[5] B24B *9/12*
U.S. Cl. 51—109 R **2 Claims**



1. In a machine for cracking-off, smoothing, bevelling and polishing the rim of a glass, comprising an upper rotatable gripping head (3) for gripping the glass (4) by its base (5), setting it into rotation about a vertical rotation axis, and urging it in a direction parallel to the rotational axis of the glass so that its rim (6) bears against the upper surface of each of two grinding wheels which are rotatable by floating motors (9), said wheels being horizontally spaced apart from one another by a fixed distance, said wheels also being arranged symmetrically and in secant fashion in respect to the direction of application of a rim of said glass (4) onto said grinding wheels, the improvement wherein:

said grinding wheels (7, 8) are dish-shaped abrasive disks disposed in a common horizontal plane substantially perpendicular to said direction;

each grinding wheel is an abrasive disk of a diameter of 100 to 300 mm and is constituted by a dish-shaped spring steel sheet (10) having a thickness of 0.5 to 3 mm, each disk having a downwardly inclined outer peripheral annular edge portion (13) having an imperforate continuous surface and an inwardly adjacent annular horizontal flat central portion (14) having an imperforate continuous surface, thereby avoiding a horizontal collision between (a) an outer edge of each disk and (b) the rim which is being applied onto said upper surface of the disk and which contains irregularities; and

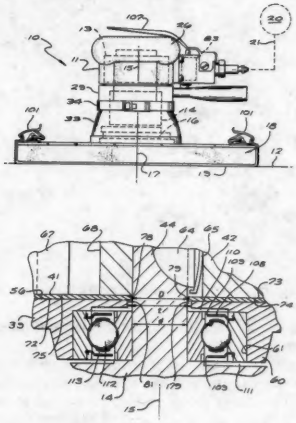
the inclination of the edge portion (13) ranges from 0.5 to 1.5 mm over a radial distance of between 5 and 15 mm.

4,986,036

ABRADING OR POLISHING TOOL

Donald H. Hutchins, Sierra Madre, Calif., assignor to Hutchins Manufacturing Company, Pasadena, Calif.

Filed Mar. 3, 1990, Ser. No. 488,226
Int. Cl.[5] B24B *23/00*
U.S. Cl. 51—170 R **9 Claims**



1. A portable abrading or polishing tool comprising:

a body structure adapted to be held by a user to manipulate the tool;

an air motor carried by said body structure;

a head movable relative to said body structure by said air motor and adapted to carry an element for abrading or polishing a work surface;

said motor including a housing containing a chamber having a top wall, a bottom wall and a side wall; a rotor in said chamber adapted to be driven by air rotatively about an essentially vertical axis and having an undersurface facing downwardly toward said bottom wall of the chamber; an essentially vertical shaft driven by said rotor and projecting downwardly through said bottom wall of the housing and connected operatively to said head to drive it; and upper and lower bearings carried by said top and bottom walls respectively and journalled said shaft for rotation about said axis;

said motor including a generally horizontal wear plate within said chamber at a location above said bottom wall and beneath said rotor and in contact with said undersurface of the rotor, and which is of a material harder than said rotor and harder than said bottom wall of the housing;

said plate containing a circular opening defined by a circular inner edge of the plate centered about said axis and about a cylindrical external surface of said shaft at a level above said bottom wall and above said lower bearing;

said circular inner edge of the plate which defines said opening having an internal diameter which exceeds the diameter of said cylindrical external surface of the shaft con-

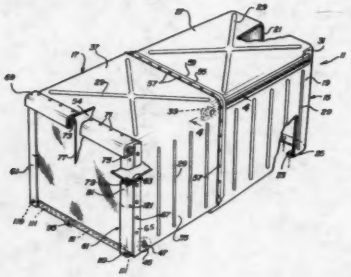
tained therein, but only very slightly, by an amount between one ten thousandth (0.0001) of an inch and six ten thousandths (0.0006) of an inch, to substantially block off all flow of air downwardly from said chamber and to said lower bearing, while maintaining a minute gap between said edge and said cylindrical surface avoiding frictional damage thereto and resistance to rotation of the shaft.

4,986,037

COLLAPSIBLE SHED FOR VEHICLES AND OTHER OBJECTS

Payton Jackson, Jr., 20358 Berg St., Detroit, Mich. 48219

Filed Jan. 11, 1990, Ser. No. 463,501
Int. Cl.[5] E04B *1/346*
U.S. Cl. 52—67 **8 Claims**



1. A collapsible shed for a vehicle and other objects comprising:

a fixed enclosure anchored to the ground surface and having an open front;

a telescoping enclosure of inverted U-shape having top and side walls with trailing edges, front and rear ends overlying and guidably mounted and supported at its rear end upon the fixed enclosure and at the front end movably supported upon the group surface, and adapted to retract from the fixed enclosure, with the combined interiors of said enclosures providing a maximum storage area;

a retractable closure upon one end of the telescoping enclosure;

said fixed enclosure including opposed side walls, a rear wall, and a top wall, said telescoping enclosure including opposed side walls and a top wall;

the mounting of said telescoping enclosure upon said fixed enclosure including a pair of elongated guide channels mounted upon and along the side walls of said fixed enclosure adjacent its top wall;

a first pair of opposed guide rollers within the rear end of said telescoping enclosure upon its opposite side walls adjacent its top wall, guidably supported within said channels; and

a second pair of opposed rollers journaled within the front end of said telescoping enclosure upon its sidewalls at their lower edges supportably bearing against said ground surface.

4,986,038

COMPONENT EXHIBIT SYSTEM

Bruce E. Backer, 4517 Newport Ave., San Diego, Calif. 92107

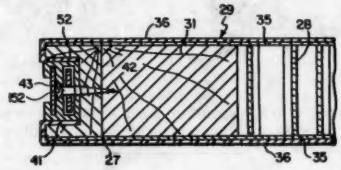
Continuation of Ser. No. 900,161, Aug. 25, 1986. This application Oct. 13, 1987, Ser. No. 106,794
The portion of the term of this patent subsequent to Dec. 15, 2004, has been disclaimed.
Int. Cl.[5] E04B *7/16*
U.S. Cl. 52—71 **16 Claims**

1. A modular full bleed panel and connective hardware system from which a variety of structures with shapes characteristic of wall segments, booths and the like may be rapidly assembled, said system comprising:

a. a plurality of full bleed panels of modular dimensions which may be connected vertically and horizontally, each panel comprising:

i. a substantially rigid internal frame fully covered on its visible surfaces, said frame having two opposite vertical edges extending from top to bottom of the panel;

ii. channel means fully recessed in each of said two opposite vertical edges of said frame for use in interconnecting the panels, said channel means in each vertical edge being formed with openings at either end thereof, said openings being at the top and bottom of said panel respectively, and positioned to enable longitudinal alignment of corresponding channel means of two panels aligned vertically, and substantially parallel alignment of two panels aligned horizontally; and



b. a plurality of modular connector means each of which is adapted for insertion into adjacent ends of said channel means of at least two adjacent panels aligned vertically or horizontally, each connector means comprising at least two elongated, substantially rigid vertical post members and a horizontal plate member cooperating therewith, each said post member having an end adapted to extend into an open end of one of said adjacent channel means, the other end of each said post member cooperating with said plate member, said post members extending respectively into said adjacent channels of said two adjacent panels, interconnected by said plate member to provide positive, substantially rigid or hinged horizontal alignment of said two adjacent panels by connection through and at the ends of the channels; and

c. stop means for defining the distance that each of said first and said second elongated post members may extend into said open end of one of said channel means.

4,986,039

OPERATING-VENT GLASS-GLAZED STANDING-SEAM SKYLIGHT

Kent A. Weisner, Maitland, Fla., assignor to SNE Enterprises, Inc., New York, N.Y.

Filed Nov. 23, 1988, Ser. No. 275,509
Int. Cl.[5] E04B *7/16*
U.S. Cl. 52—72 **22 Claims**

1. A skylight for installation in a pitched roof having a planar section, said skylight having an upper end and a lower end and for passing visible light from the ambient to a building interior while minimizing ambient elements from entering a building through the skylight installation, said skylight comprising:

mounting means for securement to a planar roof section;

sash means for transmitting visible light therethrough pivotally connected to said mounting means;

opening means associated with said mounting means and sash means for controllably separating said sash means relative to said mounting means to permit ambient air to pass through said skylight installation; and

means for sealing said mounting means to said roof section; wherein the improvement comprises:

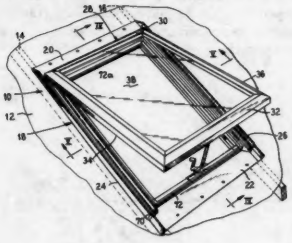
said sash means includes light-transmitting pane means and means for carrying said pane means;

said mounting means including substantially planar frame means constructed to engage a planar roof section in a substantially coplanar manner and having a pair of side edges;

said opening means including:

hinge means associated with the mounting frame and said sash at the upper end of the skylight, and

operator means associated with the lower end of the frame and the sash for moving said sash means between an open position and a closed position relative to said frame means;



primary sealing means associated with said frame means for sealingly engaging said sash means;

secondary sealing means associated with said frame means for sealingly engaging said pane means; and

said roof sealing means including elongated, upstanding seam means along an outer edge of said side edges of said frame means; and

wherein said skylight includes an internal wood member and a condensate gutter arrangement, said member constructed to carry the condensate gutter arrangement positioned such that liquid on said pane drips into said gutter and is evaporable therefrom.

4,986,040

MODULAR ELEVATOR SHAFT

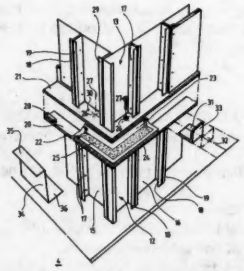
John R. Prewer, NrSittingbourne, and Leslie B. Power, Epsom, both of England, assignors to Inventio AG, Switzerland

Filed Dec. 15, 1989, Ser. No. 451,432

Claims priority, application United Kingdom, Dec. 19, 1988, 8829603

Int. Cl.[5] **B66B** *9/00;* **E04F** *15/14;* **E04H** *1/00*

U.S. Cl. 52—79.1 **20 Claims**



1. An elevator shaft comprising:

a generally vertically extending stack of individual, self-supporting, prefabricated shaft modules, each said module having a structural strength sufficient to support the module or modules above thereby permitting supporting of the shaft from a lower one of said modules; and

means provided on at least one of adjacent ones of said modules for defining a void between vertically spaced portions of said adjacent modules to contain a fluid material, the void being filled with a structural resin which sets to form a solid bed of resin material supporting and maintaining said vertically spaced portions of said adjacent modules apart.

4,986,041

PREFABRICATED ELEVATOR SHAFT MODULES

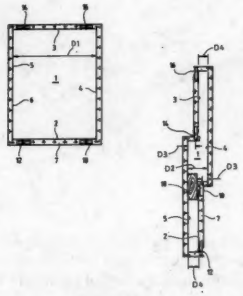
John R. Prewer, Bapchild, and Leslie B. Power, Epsom, both of England, assignors to Inventio AG, Switzerland

Filed Dec. 19, 1989, Ser. No. 452,965

Claims priority, application United Kingdom, Dec. 19, 1988, 8829603

Int. Cl.[5] **B66B** *9/00;* **E04B** *1/00, 1/344*

U.S. Cl. 52—79.5 **13 Claims**



1. A prefabricated elevator shaft module for the construction of complete elevator shafts in building structures comprising: a plurality of generally vertically extending walls connected together to form a multi-sided module including a pair of spaced apart side walls connected together by a front wall and a rear wall spaced apart a first predetermined distance, each of said spaced apart side walls being foldable along at least one generally vertically extending axis whereby, when said spaced apart side walls are folded, said spaced apart front and rear walls are spaced from each other by a second predetermined distance less than said first predetermined distance.

4,986,042

BORDER AND LANDSCAPING BRICKS

Anton Richardt, 850 Talmadge Ave., Wickliffe, Ohio 44092

Filed May 31, 1989, Ser. No. 359,650

Int. Cl.[5] **E02D** *27/00;* **A01G** *1/00*

U.S. Cl. 52—102 **2 Claims**

1. A twelve-sided enclosed landscape border directly placed on the ground and free of cement or mortar, said landscape border comprising:

twelve identical one-piece V-shaped bricks placed end to end with each other to form said twelve-sided enclosure, each of said one-piece V-shaped bricks having first and second leg portions disposed at a 30° angle to each other; and

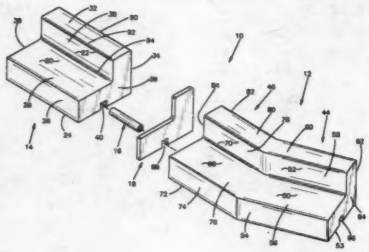
a plurality of connector pins interconnecting said one-piece V-shaped bricks and securing said one-piece V-shaped bricks together on the ground in a manner such that each of said one-piece V-shaped bricks may be lifted off the ground and off said connector pine without disturbing an adjacent one-piece V-shaped brick;

each of said one-piece V-shaped bricks having an L-shaped cross-sectional configuration and including an outer ground engaging portion and an inner upstanding border

portion, said border portion extending upward and generally perpendicular from said ground engaging portion for a distance of about two inches;

said ground engaging portion of each of said one-piece V-shaped bricks having opposite ends and a flat bottom surface placed directly on the ground and extending between said opposite ends, an end surface at each end intersecting said flat bottom surface, first surface means defining a first connector pin recess at one end of said ground engaging portion, and second surface means defining a second connector pin recess at the other end of said ground engaging portion;

each of said connector pin recesses extending from its respective end surface and longitudinally along said flat bottom surface of said ground engaging portion for a distance substantially less than one-half of the length of said ground engaging portion;



each of said connector pin recesses being open to the ground and extending upwardly into said ground engaging portion for no more than one-half of the height of said ground engaging portion;

each said connector pin being of a length substantially equal to the combined lengths of said connector pin recesses at the opposite ends of said ground engaging portion and being located in adjacent connector pin recesses in adjacent one-piece V-shaped bricks and interconnecting said adjacent bricks and securing the bricks together on the ground;

each of said one-piece V-shaped bricks resting by its own weight on the ground and being liftable off the ground and off said connector pins without substantially disturbing any other of said one-piece V-shaped bricks.

4,986,043

DEVICE FOR ERECTING AND PLUMBING A WALL FRAME UNIT

Gordon L. Love, 11870 Long Lake Dr., Sparta, Mich. 49345

Filed Feb. 28, 1990, Ser. No. 485,485

Int. Cl.[5] E04G *21/04*

U.S. Cl. 52—127.2 **10 Claims**

1. A device for drawing two wall frame units together comprising:

(A) a pulled unit which is mounted on a first wall frame unit and which includes

(1) a monolithic, one-piece L-shaped angle bracket having first and second legs and fastener-receiving holes defined through said first leg,

(2) said first wall frame unit including a top area, a side surface adjacent to said top area and a top surface adjacent to said top area,

(3) said angle bracket having said first leg engaged against a top area side surface, and said second leg engaged against said top area top surface, and having a bracket top surface,

(4) an ear mounted on said bracket top surface and having an opening defined therethrough, and

(5) fasteners attaching said angle bracket to said first wall frame unit adjacent to said top area;

(B) a puller unit which is mounted on a second wall frame unit and which includes

(1) said second wall frame unit including a top area having a side surface and a top surface,

(2) a monolithic, one-piece C-shaped bracket mounted on said second wall frame unit adjacent to said second wall frame unit top area and including

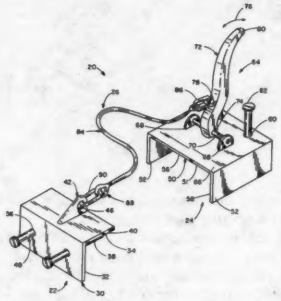
(a) a central body section having a top surface and an under surface in contact with said second wall frame unit top surface,

(b) two side flanges on sides of said central body section,

(c) fastener-receiving holes defined in said central body section, and

(d) fasteners extending through said puller unit central body section fastener-receiving holes and attaching said C-shaped bracket to said second wall frame unit,

(3) two spaced apart trunnions mounted on said central body section top surface,



(4) a pivot pin attached at each end thereof to one of said trunnions and extending therebetween above said central body section top surface, and

(5) a lock handle having a proximal end pivotally attached to said pivot pin and moving from a position extending along said second wall frame unit top surface to a position extending essentially perpendicular to said second wall frame unit top surface, said lock handle having a distal end located remote from said proximal end, and a U-shaped fastener attached to said lock handle between said proximal end and said distal end; and

(C) a cable unit having a flexible cable having a quick-release ring on one end thereof and a mounting ring on another end thereof, said mounting ring being fixed to said lock handle U-shaped fastener to move with said lock handle; and

(D) a coupling ring fixed to said pulled unit ear via said ear opening, said cable unit quick-release ring being coupled to said coupling ring to attach the first wall frame unit to the second wall frame unit via said pulled unit, said puller unit and said cable unit.

4,986,044

ADJUSTABLE DOOR FRAME

Michael A. Funari, Erie, Pa., assignor to Fenestra Corporation, Erie, Pa.

Filed Jul. 17, 1989, Ser. No. 381,041

Int. Cl.[5] E06B *1/04*

U.S. Cl. 52—213 **6 Claims**

1. An adjustable door frame comprising a first side frame section and a second side frame section,

said first side frame section comprising a fixed frame section and a sliding frame section,

a header means attached to said first side frame section and said second side frame section,

said fixed frame section having a first jamb flange and a first casing flange,

said sliding frame section having a second jamb section and a second casing flange integrally connected together,

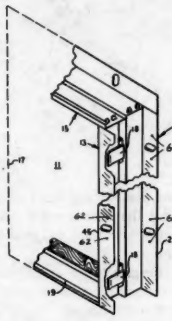
said first casing flange comprising a first part and a second part being disposed generally in parallel planes adjacent one another,

vertically spaced guide clips supported on said fixed frame section,

friction means on said guide clips holding said guide clips in position,

said guide clips having a plate-like body made of resilient material,

the ends of said plate-like body being bent generally at right angles relative to said body defining spaced legs adapted to rest on said frame section,



a tongue integrally attached to said body adjacent one said leg defining a space between said tongue and said body and extending in cantilever fashion on the side of said body opposite said legs and generally parallel to and inclined toward said plate-like body to a position adjacent the other said leg,

said tongue engaging said second casing flange and said second casing flange and adapted to slidably and snugly receive said second casing flange in said space between said tongue and said body wherreby said second casing flange is held in position parallel to said first casing flange on said fixed frame section whereby said tongue frictionally engages said second casing flange and said second casing flange is frictionally held in adjusted position parallel to said first casing flange on said fixed frame section.

4,986,045

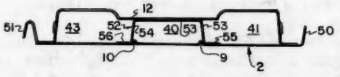
CELLULAR RACEWAY

Charles N. Domigan, Coolville, Ohio, and J. David Harmon, Vienna, W. Va., assignors to Butler Manufacturing Co., Kansas City, Mo.

Continuation of Ser. No. 216,168, Jul. 7, 1988, abandoned. This application Jul. 13, 1989, Ser. No. 379,215

Int. Cl.[5] E04F *17/08*

U.S. Cl. 52—221 **2 Claims**



1. In a cellular raceway constructed of roll formed pieces all welded together including a base member, an upper member, and barrier means.

the base member comprising:

a flat base center section;

first and second flat base outboard sections:

the base center section and the first and second base outboard sections respectively lying in a plane;

first and second ribs respectively connecting the base center section to the first and second outboard sections, each rib being in the form of a reverse bend;

the upper member comprising:

an upper center section disposed over and spaced from said plane containing said base center section;

first and second flat, coplanar upper outboard sections respectively disposed over and spaced from said plane containing said first and second base outboard sections;

the first and second upper outboard sections being spaced from said plane a greater distance than said upper center section;

first and second outboard walls connected respectively to said first and second upper outboard sections and extending toward and connected respectively to said flat base outboard sections, the connections being by welding;

each said outboard wall closing off the space between the upper outboard section to which it is connected and the base outboard section to which it is connected;

the extension of said outboard walls each being at an obtuse angle with respect to its upper outboard section;

said barrier means comprising a first and second spaced apart, disconnected angle members comprising:

the first angle member a foot section closely adjacent to said first rib and welded to said first base outboard section and a riser extending toward and engaging said upper center section; and

the second angle member having a foot section closely adjacent to said second rib and welded to said second base outboard section and a riser extending toward and engaging said upper center section.

4,986,046

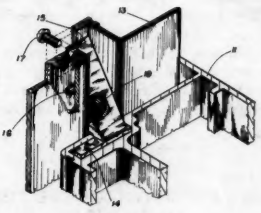
METHOD AND APPARATUS FOR INSTALLING A CURTAIN WALL

Renato E. Mazzarantani, 7933 NW. 71st St., Miami, Fla. 33166

Filed Oct. 25, 1989, Ser. No. 426,889

Int. Cl.[5] E04H *1/00, 3/00*

U.S. Cl. 52—235 **5 Claims**



1. An apparatus for installing panel members of a curtain wall, comprising:

guide means, said guide means including a rail system having both guiding and guided members; and

said guided members being integrally connected to said panel members, said guided members being slidably associated with said guiding members in parallel association;

latch means, said latch means being hingedly connected to said guided member; and

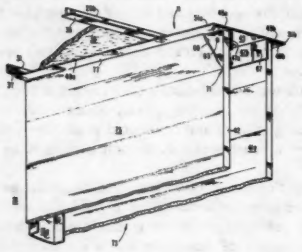
support means for supporting the weight and wind load of a panel member, said support means being affixed to said guiding member and being disposed thereon to operatively engage corresponding latch means in load supporting relation.

4,986,047

HEAD TRACK SYSTEM AND METHOD

Richard S. Power, Indianapolis, Ind., assignor to Interior Creators, Inc., Indianapolis, Ind.

Continuation of Ser. No. 53,159, May 21, 1987, Pat. No. 4,899,509. This application Feb. 5, 1990, Ser. No. 475,170
Int. Cl.[5] E04H *3/00*
U.S. Cl. 52—238.1 13 Claims



1. A partition system, comprising:

(a) a suspended ceiling having a grid of bars supporting a plurality of ceiling tiles, said bars each having a flat bottom surface;

(b) a partition framework including a plurality of spaced, upright studs;

(c) a parallel pair of upright wall panels secured to opposite sides of said partition framework, said wall panels each having a thickness and an upper edge;

(d) a one-piece construction head track interconnecting said grid, said partition framework and said wall panels, said head track being secured to said ceiling grid and having

an elongated, horizontal web;

a pair of laterally opposed, elongated, coplanar, horizontal flanges extending from said web over said upper edges of said wall panels, said horizontal flanges each having a flat upper surface in contact with the flat bottom surfaces of said plurality of bars and further having an exposed flat bottom surface outward of said wall panels; and

a pair of laterally opposed, elongated, vertical flanges extending downward from said web between said wall panels and said partition framework,

wherein said web, said horizontal flanges, and said vertical flanges are integral; and

(e) an exterior coating of finishing compound between said upper edges of said wall panels and said horizontal flanges.

4,986,048

METHOD AND APPARATUS FOR ERECTING A GLASS BLOCK WALL

Robert M. McMarlin, Murraysville, Pa., assignor to Pittsburgh Corning Corporation, Pittsburgh, Pa.

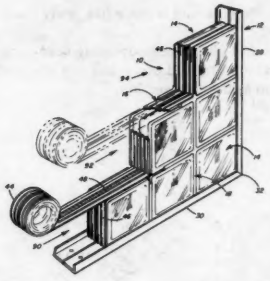
Filed Jan. 11, 1990, Ser. No. 463,386
Int. Cl.[5] E04B *5/46*
U.S. Cl. 52—306 12 Claims

1. A block wall comprising,

a plurality of blocks having a generally rectangular configuration with vertical and horizontal end walls and a pair of side walls, said side walls and said end walls forming edge portions therebetween, said blocks having a preselected thickness between said side walls,

a border member having a body portion and a pair of longitudinal flanged edge portions extending angularly therefrom, said flanged edge portions converging inwardly toward each other, said flanged edge portions spaced from each other a dimension slightly less than said preselected thickness of said blocks, certain of said blocks arranged to have said side walls frictionally engaged between said border member flanged edge portions,

spacer members arranged to be positioned between said adjacent vertical end walls and horizontal end walls of said blocks, said spacer members having a body portion, longitudinal end portions and a transverse dimension



smaller than said preselected thickness of said blocks to provide a channel shaped recessed portion between said adjacent block edge portions and said spacer longitudinal edge portion, and

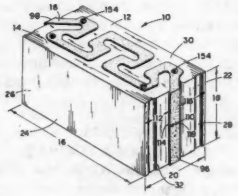
a filler material arranged to be positioned in said recessed portions to secure said blocks to each other and to said spacer member end portions.

4,986,049

INSULATED BUILDING BLOCK

Francis A. Kennedy; John P. Neff, both of Williamsville, and Kenneth J. Blake, East Aurora, all of N.Y., assignors to ThermaLock Products, Inc., North Tonawanda, N.Y.

Filed Nov. 9, 1989, Ser. No. 433,842
Int. Cl.[5] E04C *1/00*
U.S. Cl. 52—309.12 23 Claims



1. An insulated building block of substantially rectangular shape comprised of a first spaced outer supportive part, a second spaced outer supportive part, curvilinear means for laterally interlockably connecting said first spaced outer supportive part and said second space outer supportive part, and a substantially curvilinear, integral inner insulating portion, wherein:

(a) each of said first spaced outer supportive part and said second spaced outer supportive part extends along the length of said building block, is comprised of an inner surface defining a side of the space between said parts, and has a configuration which differs from the configuration of the other of said spaced outer supportive parts;

(b) said space between said first and second spaced outer supportive parts is substantially curvilinear in cross section as viewed from the top of said building block;

(c) said space between said first and second spaced outer

supportive parts is wedge-shaped and is defined by walls which extend inwardly from the top of said building block to the bottom of said building block;

(d) said insulating portion is positioned within an substantially fills the space between said first spaced outer supportive part and said second spaced outer supportive part, thereby forming said susbstantially rectangular building block;

(e) said building block is comprised of two opposite planar sidewalls, two opposite planar ends, a planar top, and a planar bottom;

(f) each of said planar sidewalls is parallel to the other of said planar sidewalls, each of said planar ends, is parallel to the other of said planar ends, and said planar top is parallel to said planar bottom;

(g) said insulating portion is substantially centered between and extends beyond each of said two planar ends;

and

(h) said insulating portion extends beyond at least one of said planar top surface and said planar bottom surface of said building block.

4,986,050

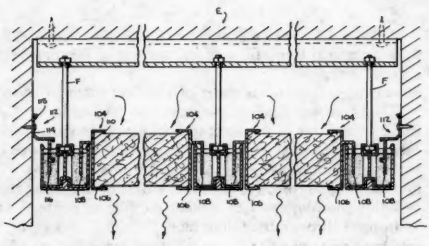
MODULAR SUPPORT SYSTEM FOR A FILTER-TYPE CEILING GRID

Armando Brunetti, W. Paterson; Eric Johnson, Wyckoff, and Laura Martz, Morristown, all of N.J., assignors to Filtra Corporation, Hawthorne, N.J.

Filed Aug. 22, 1989, Ser. No. 396,652

Int. Cl.[5] B01D *46/00*

U.S. Cl. 52—488 **15 Claims**



1. A support member for a modular support system for supporting a plurality of filters, the modular support system including a plurality of connectors for joining adjacent horizontally disposed support members, each of the connectors including at least two arms extending radially from a center section, each of the arms includes first and second side walls, said support member, comprising:

upwardly open channel means for receiving a sealant, said channel means including at least first and second side walls;

first and second end portions, at least one of said first and second end portions being adapted to be operably associated with an arm of a connector; and

at least one of said first and second walls including retaining means adjacent said at least one of said first and second end portions for releasably securing said support member to the connector, said retaining means including a lip extending inwardly of said channel means and longitudinally along an upper edge of the at least one of said first and second walls of said channel means for providing a snap fit between said channel means and the corresponding arm of the connector,

wherein said lip is adapted to permit said channel means to be secured to the corresponding arm of the connector when positioned below the arm by moving the channel means vertically relative thereto and when secured to the connector said lip rests on a top surface of a corresponding wall of the arm of the connector.

4,986,051

ROOF TRUSS AND BEAM THEREFOR

Dolph A. Meyer, 4 Marook Street, Carlingford, New South Wales, Australia 2118 , and Wyatmodjo Sardjono, 29 Edward Street, Ryde, New South Wales, Australia 2112

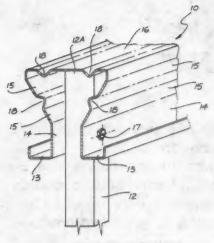
PCT No. PCT/AU88/00188, § 371 Date Dec. 11, 1989, § 102(e) Date Dec. 11, 1989, PCT Pub. No. WO88/09854, PCT Pub. Date Dec. 15, 1988

PCT Filed Jun. 14, 1988, Ser. No. 449,967

Claims priority, application Australia, Jun. 12, 1987, PI2444

Int. Cl.[5] E04C *3/30*

U.S. Cl. 52—738 **8 Claims**



1. A structural beam for use as an upper chord in a roof truss and composed of rolled form metal strip material having in cross-section a shape including a plurality of longitudinally extending integral portions, said beam comprising:

a first roof batten-fixing portion, a pair of parallel portions beneath and substantially perpendicular to said first portion and spaced apart less than the width of said first portion and providing means for connection to an upper end of at least one web member, a pair of portions divergingly interconnecting upper ends of respective ones of said parallel portions to adjacent lateral edges of said first portion, and flanges extending outwardly at substantially right angles from respective lower ends of said parallel portions.

4,986,052

TRUSS SETTING SYSTEM

Thomas E. Nelson, 7740 Ligonier Ct., Orlando, Fla. 32819

Continuation of Ser. No. 192,228, May 10, 1988, Pat. No. 4,878,323. This application Nov. 7, 1989, Ser. No. 432,487

The portion of the term of this patent subsequent to Nov. 7, 2006, has been disclaimed.

Int. Cl.[5] E04C *3/11*; E04B *7/06*; E04G *21/14*

U.S. Cl. 52—745 **19 Claims**

1. A method for setting trusses in construction of a building at a site, comprising the steps of:

preparing a slab on site, said slab having a plurality of anchor bolts protruding upwardly along a peripheral margin of said slab;

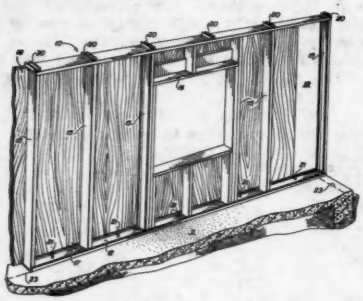
prefabricating, off site, a plurality of rectangular wall panels, each panel having an elongated top plate with an upper surface, an elongated bottom plate extending parallel to and spaced from said top plate, a plurality of studs transversely positioned to extend at longitudinally spaced intervals between said plates, and a series of truss locks formed with channels located at longitudinally spaced intervals along said upper surface;

prefabricating, off site, a plurality of roof truss units, each having a generally triangular configuration with elongated top chords arranged to extend diagonally from free ends to converge at a peak, and an elongated bottom

chord extending horizontally to connect points adjacent said free ends of said top chords;

transporting said off-site prefabricated panels and units to said site;

erecting said panels, on site, in opposing upright positions on



said slab over said anchor bolts to form opposite walls of a building structure; and

raising said units up to straddle said erected walls, with opposite ends of said bottom chords captured within respective opposing ones of said channels, said spacing intervals serving to space said units.

4,986,053

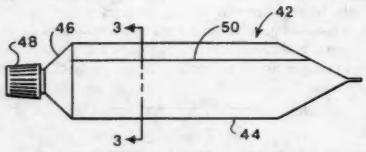
METHODS OF MAKING IMPROVED PACKAGES

Suzanne E. Schaefer, Neenah, Wis., assignor to American National Can Company, Chicago, Ill.

Division of Ser. No. 273,015, Nov. 22, 1988, abandoned, which is a continuation-in-part of Ser. No. 132,833, Dec. 14, 1987, abandoned. This application May 15, 1989, Ser. No. 351,900

Int. Cl.[5] B65B *3/00, 29/00, 43/10;* **B65D** *85/14*

U.S. Cl. 53—401 **4 Claims**



1. A method of making a package comprising:

(a) selecting a packaging structure for use in making said package, said packaging structure comprising a sheet material comprising a first layer of metal foil, said first layer of metal foil having sufficient integrity to prevent transmission of product components through said sheet material, a second layer of a covering material adhered to said metal foil layer, and on the surface of said foil opposite said second layer, a multiple layer composite comprising at least three layers and including a layer of ethylene vinyl alcohol copolymer, and a heat sealable layer on the surface of said multiple layer composite opposite said foil layer, said multiple layer composite being between about 0.035 mm. and about 0.30 mm. thick;

(b) fabricating said packaging structure, including the step of adhering said multiple layer composite to said sheet material by use of intervening adhesive means;

(c) fabricating said packaging structure into a package enclosure wherein said layer of ethylene vinyl alcohol is between said first layer of metal foil and the interior of said package, by bringing portions of said packaging structure into facing relationship, with said heat sealable layer disposed toward the interior of said package, and forming heat seals about contiguous portions thereof, leaving one side of said package open;

(d) placing, in said package, a product which would be capable of attacking said metal foil layer, absent the protection provided by said multiple layer composite between said product and said metal foil; and

(e) closing said one side of said package, to complete the fabricating, filling, and sealing of said package.

4,986,054

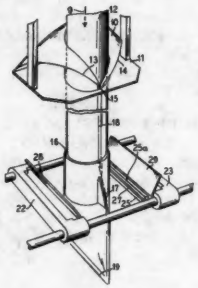
FILL TUBE SPREADER

Michael J. McMahon, Palatine, Ill., assignor to Zip-Pak Incorporated, Northbrook, Ill.

Filed Jul. 17, 1989, Ser. No. 380,485

Int. Cl.[5] B65B *9/08, 9/20*

U.S. Cl. 53—451 **8 Claims**



8. In a vertical form, fill and seal method of forming bags, the steps comprising:

advancing a continuous sheet of bag film material over a filling tube and shaping the sheet into tubular form;

joining the edges of the sheet to complete the tubular form;

forming a cross-seal laterally of the vertical forming axis of the tube and pressing the tubular form flat;

and locating a protective boot at the base of the filling tube within the film sheet to protect the film as contents are dropped through the filling tube;

said boot being of a flexible material and being flattened as a cross-seam is formed at the end of the tube with the boot filling the inside of the tube to provide a protective layer therein.

4,986,055

CUSHION COMPRESSION MACHINE FOR COMPRESSING A CUSHION AND APPLYING A COVER TO THE CUSHION

David Mintz, and Leonard Olshansky, both of West Bloomfield, Mich., assignors to Machine Design Systems, Inc., Detroit, Mich.

Filed Feb. 16, 1990, Ser. No. 481,456

Int. Cl.[5] B65B *1/24, 63/02;* **B68G** *7/00*

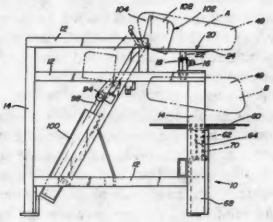
U.S. Cl. 53—526 **13 Claims**

11. A cushion compressing machine comprising a frame, a seat cushion support, means for fixing and releasing a cushion on said support,

said support being mounted for rotation from a first position in which a cover is applied to said cushion to a second position in which said cover is affixed to a frame of said cushion,

means for compressing and compacting said cushion in said first position to facilitate placing said cover over said cushion, means for releasing said cushion from said means for compressing said cushion when said cover is placed over said cushion,

means for thereafter applying force through said cover and against the face of said cushion to compress said cushion



and facilitate attachment of said cover to a cushion seat frame attached to said cushion.

4,986,056

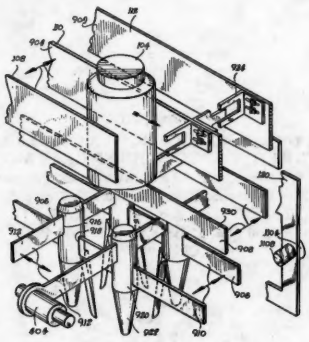
LANE ADJUSTING APPARATUS FOR BOTTLE GUIDES

Neil L. Evans, Fox Lake; Aldo L. Tombolato, Des Plaines; Robert R. Reynolds, Lake Zurich, and Robert J. Meisner, Hinsdale, all of Ill., assignors to Kraft, Inc., Glenview, Ill.

Continuation of Ser. No. 390,625, Aug. 7, 1989, abandoned, which is a division of Ser. No. 105,100, Oct. 5, 1987, Pat. No. 4,880,104. This application Mar. 1, 1990, Ser. No. 488,482

Int. Cl.[5] B65B *35/30, 5/08*

U.S. Cl. 53—539 2 Claims



1. Adjustable grid packing apparatus, comprising:

an upper adjustable lane guide assembly comprising a plurality of upper layer lane guides;

upper lane guide rotational adjustment and support means for supporting the upper layer lane guides at a predetermined separation distance determined by the rotational position of at least one threaded, axially telescoping adjustment mechanism separating and supporting the upper layer lane guides;

a lower, bidirectional adjustable lane grid assembly comprising a first plurality of lower lane guide grid elements parallel to and aligned with the upper layer lane guides and a second plurality of lane guide grid elements oriented generally orthogonally to the first plurality of lane guide grid elements;

first lane grid rotational adjustment and support means for supporting the first plurality of lane guide grid elements at a predetermined separation distance determined by the rotational position of at least one threaded, axially telescoping adjustment element separating and supporting the first plurality of lane guide grid elements and second lane grid rotational adjustment and support means for supporting the second plurality of lane guide grid elements at a predetermined separation distance determined by the rotational position of at least one threaded, axially telescoping adjustment mechanism separating and supporting the second plurality of lane guide grid elements;

an adjustable, shifting support array of support elements positioned intermediate the upper lane guide assembly and the lower grid assembly for supporting articles between the upper layer lane guides;

a plurality of article guide means positioned at the zones of intersection of the first plurality of lower lane guide grid elements, and the second plurality of lane guide grid elements for guiding an article through openings defined by the first and second plurality of lane guide grid elements;

shifting support rotational adjustment and support means for supporting the support elements at a predetermined separation distance determined by the rotational position of at least one threaded, axially telescoping adjustment element separating and supporting the support elements; and

means for shifting the adjustable support array with respect to the upper lane guide assembly to remove support for articles positioned between the upper lane guides.

4,986,057

APPARATUS FOR HANDLING AND WRAPPING BALES

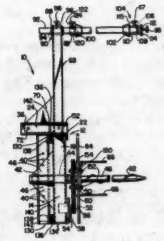
Douglas Gainforth, R.R. #1, Wooler, Ontario, Canada K0K 3M0

Filed Nov. 1, 1988, Ser. No. 265,773

Claims priority, application Canada, Sep. 7, 1988, 576709

Int. Cl.[5] B65B *11/04*

U.S. Cl. 53—556 12 Claims



1. A bale wrapping apparatus comprising:

a frame;

engaging means mounted on said frame for engaging and lifting a bale to be wrapped;

means associated with said engaging means for rotating said bale about an axis when said bale is supported on said engaging means;

a support beam mounted on said frame but offset therefrom for receiving a roll of wrapping material, for rotation with respect to said beam, wherein said support beam is located radially outwardly of said bale, extends in a direction substantially parallel to said axis, and is secured against rotation about its longitudinal axis;

tensioning means selectively positionable along said support beam for accommodating a plurality of different widths of wrapping material and for varying the force required to be exerted on said wrapping material, to place said material under stretching tension and allow said roll to rotate with respect said beam to unroll the wrapping material as said bale is rotated, wherein each of said widths corresponds substantially to the widths of a respective bale to be wrapped, and wherein said tensioning means comprises a pair of members mounted on said beam and adapted to exert a preselected frictional force against rotation on a center spindle of a roll of wrapping material mounted on said beam, at least one of said pair of members being

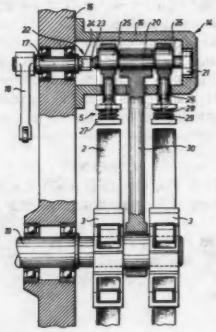
slidable longitudinally of said beam, and a clamp associated with each of said slidable members for immovably fixing the position of each of said members along said beam and relative to said roll.

4,986,058

PRESSURE APPLICATION ARRANGEMENT ON A PACKING MACHINE

Lars C. Carlsson, Blentarp, and Vilnis Bruveris, Malmö, both of Sweden, assignors to AB Tetra Pak, Lund, Sweden

Filed Apr. 16, 1987, Ser. No. 38,982
Claims priority, application Sweden, Apr. 18, 1986, 8601781
Int. Cl.[5] B65B *51/10*
U.S. Cl. 53—563 11 Claims



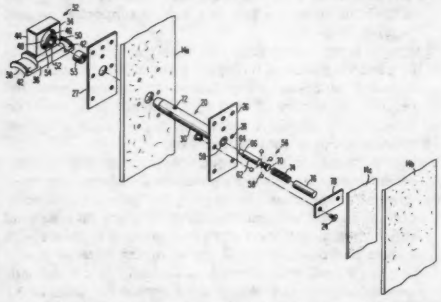
1. An arrangement for application of pressure on a packing machine including an indexable, rotatable mandrel wheel with radial mandrels (2) for positioning packing container blanks to form sealed bottoms of the packing container blanks, comprising a shaft with eccentrically arranged portions, the shaft being connected to pressure devices cooperating with the mandrels and to means connected to the mandrel wheel for absorbing tensile forces.

4,986,059

BALL JOURNAL DEVICE FOR CONNECTING A SHAFT TO A HARNESS

M. Gaylord Boutilier, P.O. Box 236, East Livermore, Me. 04228

Continuation of Ser. No. 264,658, Oct. 27, 1988, abandoned.
This application May 8, 1990, Ser. No. 519,325
Int. Cl.[5] B68B *1/00*
U.S. Cl. 54—2 19 Claims



1. A device for connecting a shaft to a harness which device comprises, in combination:

(a) a harness pin assembly adapted to be fixedly mounted on a harness saddle which pin assembly adapted to be fixedly mounted on a harness saddle which pin assembly comprises mounting means for securing said pin assembly to said saddle; an elongated round harness pin having an inner end affixed to said mounting means, said harness pin projecting outwardly at an angle of approximately 90° from said mounting means and having an outer end; and a normally-locked releasable locking device on said harness pin and positioned intermediate said mounting means and said outer end; and

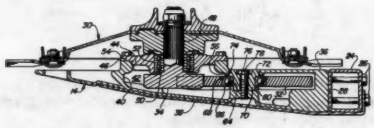
(b) a connector assembly for releasably connecting said harness pin assembly to said shaft which connector assembly comprises a housing member comprising an elongated base member having a topside, an underside and an upper portion rigidly secured to and extending substantially perpendicular from the topside of said base member eliminating any relative movement between the base member and upper portion, the underside of said base member being adapted to fit on said shaft along the longitudinal axis thereof and said base member being adapted to be secured to said shaft, said upper portion being provided with a ball-retaining aperture means positioned over said base member and having an axis substantially perpendicular to the length of said base member; a ball member rotatably secured in said ball-retaining aperture means and provided with a cylindrical core hole through the center thereof adapted to receive said harness pin; said locking device being adapted to permit said harness pin to be inserted into said cylindrical core hole past said locking device when said locking device is in an unlocked position while positively locking said ball member on said harness pin when said locking device is in a normally locked position.

4,986,060

MODULAR ROTARY MOWER CUTTERBAR INCORPORATING UNIQUE IDLER GEAR MOUNTING

James C. Walters; Craig A. Richardson, and Michael J. Verhulst, all of Ottumwa, Iowa, assignors to Deere & Company, Moline, Ill.

Filed Jun. 1, 1990, Ser. No. 531,606
Int. Cl.[5] A01D *34/76*
U.S. Cl. 56—6 6 Claims

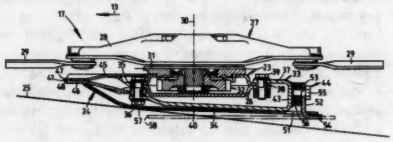


1. In a rotary mower cutterbar including a gear housing containing a spur gear train including a plurality of idler gears having bearings mounted centrally thereto, mounting structure for each of said idler gears comprising: a circular opening provided in a top wall of the housing; a cylindrical receptacle formed integrally with a bottom wall of the housing in axial alignment with said opening and having an upper end defining an annular upwardly facing bearing seating surface; a stub shaft tightly received in an inner race of a bearing carried by one of said idler gears and in said receptacle; one side of said inner race being engaged with said bearing seating surface; and said stub shaft including an enlarged head engaged with another side of said inner race and being tightly disposed within said opening; and screw means being received in said stub shaft and said bottom wall for holding said enlarged head of the stub shaft tightly against said inner race of the bearing.

4,986,061
MOWER WITH SKIDS

Johnny Frumholtz, Saverne, and Roland Helfer, Lampertheim, both of France, assignors to Kuhn, s.a., Saverne, France

Filed Sep. 13, 1989, Ser. No. 406,577
Claims priority, application France, Sep. 13, 1988, 88 12071
Int. Cl.[5] A01D *34/63*
U.S. Cl. 56—6 18 Claims



1. A mower having a direction of advance during working operation and comprising at least one mowing group provided with:

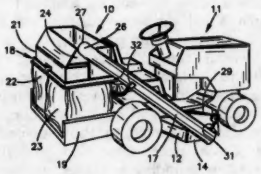
(a) a cutting bar that comprises a carrying beam and cutting elements, at least some of said cutting elements being supported by said carrying beam, said cutting bar extending during work close to a ground to be mown; and

(b) skids by which said cutting bar slides over said ground during work, each one of said skids being connected to said cutting bar by a front connection and a rear connection when considering said direction of advance during work, each one of said skids comprising a sole adapted during use of said mower to be in contact with said ground, said sole having a front part and a rear part when considering said direction of advance during work, said rear connection connecting said rear part of said sole to said cutting bar and comprising connecting means that allow said rear part of said sole to separate from said cutting bar, in a relative movement directed backwardly when considering said direction of advance during working operation of said mower, after separation of said rear part of said sole from said front part of said sole due to excessive wear.

4,986,062
BAGGER ATTACHMENT FOR GRASS MOWERS

Amos G. Hill, Orangeburg, S.C., assignor to White Consolidated Industries, Inc., Cleveland, Ohio

Filed Jan. 18, 1990, Ser. No. 467,140
Int. Cl.[5] A01D *35/22*
U.S. Cl. 56—16.9 20 Claims

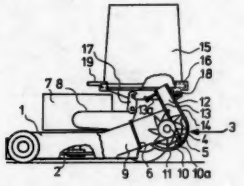


1. In a mower having a rotary cutter element within a mowing housing, said cutter being adapted to remove material from the ground and expel such material through a discharge opening in said housing, the improvement comprising an auger tube having an inlet opening communicating with said discharge opening and an outlet end, container means associated with said outlet end to receive material moving therefrom, and an elongated powered auger extending along said auger tube from said inlet opening towards said outlet end, said auger operating to compress and move said material from said inlet opening and to discharge it through said outlet end, said auger tube providing a lower semicylindrical wall closely fitting a lower side of said auger and an upper wall portion spaced from an upper side of said auger having a noncircular shape, said material moving along said auger tube engaging said upper wall portion resisting rotation of said material with said auger and promoting movement of said material by said auger along said housing, a space between said auger and said upper wall portion accommodating movement of objects along said housing.

4,986,063
METHOD AND APPARATUS FOR COMPACTING GRASS, LEAFAGE OR SIMILAR MATERIAL

Alfred Eggenmuller, Schutzenweg 10, D-7915 Elchingen 1, Fed. Rep. of Germany

Filed Oct. 18, 1989, Ser. No. 423,273
Claims priority, application Fed. Rep. of Germany, Oct. 19, 1988, 3835570; Jan. 14, 1989, 3900969
Int. Cl.[5] A01D *34/70*
U.S. Cl. 56—16.6 15 Claims



1. A method for comparing grass, leafage, or similar material during the feeding thereof from a movable motor-driven cutting/collecting apparatus through a press channel, comprising the steps:

(a) combined comminuting by tearing, crushing and smashing of said material and feeding of said material by a single rotating compacter means; and

(b) simultaneously compacting said comminuted material during further compressing through said press channel loaded by said material already packed therein by said single rotating compacter means.

4,986,064
HARVESTING MACHINE

Rino Ermacora, Saverne, France, assignor to Kuhn S.A., Saverne Cedex, France

Continuation of Ser. No. 117,928, Nov. 4, 1987, abandoned, which is a continuation of Ser. No. 755,783, Jul. 17, 1985, abandoned. This application Nov. 7, 1988, Ser. No. 270,455
Claims priority, application France, Jul. 19, 1984, 84 11626
Int. Cl.[5] A01B *73/00*
U.S. Cl. 56—228 22 Claims

1. A crop harvesting machine displaceable on a ground, said crop harvesting machine comprising:

(a) a body having working tools and a structure supporting said working tools, said body further having a longitudinal axis and a vertical middle plane extending at least approximately parallel to a working direction;

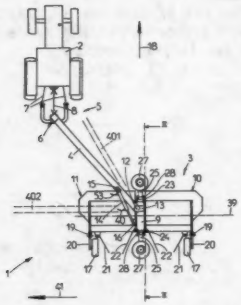
(b) two spaced apart first wheels extending when considering said working direction behind said working tools and connected to said structure by means permitting a modification of the vertical position of said first wheels in relation to said body, said first wheels being in contact with said ground during working in order to support said body during working;

(c) first means for controlling said modification of the vertical position of said first wheels in relation to said body;

(d) two spaced apart second wheels separate from said first wheels and being in contact with said ground during transport in order to support said body during transport,

said second wheels extending at least approximately in the vicinity of said vertical middle plane of said body and being, when considering said working direction, connected to said structure in such a manner that one of said second wheels is connected to a front part of said structure and the other of said second wheels is connected to a rear part of said structure, and in such a manner as to be able to be brought from a rest position off the ground to a transport position where said second wheels are in contact with said ground;

(e) a tongue connected to said structure by a joint having an upwardly directed axis, whereby said tongue is able to pivot in relation to said body between at least one working



position and a transport position, and whereby said longitudinal axis of said body extends crosswise to said working direction during working and at least approximately parallel to a transport direction during transport, said joint extending at least approximately in the vicinity of said vertical middle plane of said body;

(f) second means for positively moving said tongue between said at least one working position and said transport position; and

(g) means acting between said body and said tongue at a position spaced from said joint for additionally connecting said tongue to said body when said tongue is in said transport position, said additional connecting means preventing swaying of said body during transport.

4,986,065

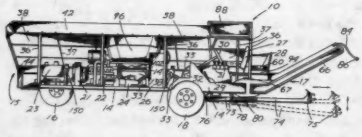
AGRICULTURAL HARVESTER

Ira Compton, 2434 Dayton Rd., Chico, Calif. 95928

Filed Jan. 19, 1990, Ser. No. 467,514

Int. Cl.[5] A01D *46/00*

U.S. Cl. 56—340.1 **5 Claims**



1. An agricultural harvester structured of a first harvester section and a separate second harvester section adapted to harvest produce such as nuts and fruits directly from a tree, both said harvester sections adapted to simultaneously and cooperatively function together with one said harvester section adjacent one side of a tree and the other said harvester section adjacent an oppositely disposed side of said tree in a harvesting position during harvesting of said produce;

each said harvester section having a frame with a plurality of wheels attached thereto adapted to provide mobility of said harvester section; each said harvester section having a seat affixed thereto adapted for sitting on by an operator of said harvester section during said harvesting; each said harvester section having an engine attached thereto; each said harvester section having a wheel rotating means powered by said engine adapted to rotate at least one said wheel to propelled said harvester section; each said harvester section having a control means affixed adjacent said seat adapted to provide control of said rotation of said at least one said wheel by said operator while sitting on said seat; each said harvester section having steering mechanics attached to wheel support structure of at least one said wheel adapted to pivot said wheel to provide steering of said harvester section; each said harvester section having a control means affixed adjacent said seat adapted to provide said operator control of said steering mechanics; each said harvester section having a produce catch platform attached to said frame by a plurality of support members; each said catch platform positioned at an angle sloping from a high lengthwise side edge thereof to a lower lengthwise side edge thereof, said catch platforms adapted to provide a generally V-shaped produce landing surface below limbs of said tree with said harvester sections in said harvesting position; each said harvester section having an attached produce conveying means extending at least the length of and along said lower side of said catch platform adapted to receive harvested said produce from said catch platform and convey said produce into at least one produce carrying structure temporarily attached to at least one said harvester section; each said harvester section having a control means affixed adjacent said seat adapted to provide said operator control of said produce conveying means; each said harvester section having a hingedly attached seal panel of generally equal length of said catch platform, each said seal panel positioned along an outside edge of said produce conveying means of each said harvester section; each said seal panel further attached to a movement actuating means powered by said engine of said harvester section adapted to move said seal panel between a generally horizontal position to a generally vertical position and back to a generally horizontal position; each said harvester section having a control means affixed adjacent said seat adapted to provide controlled selection of said position of said seal panel by said operator while sitting on said seat; each said harvester section having a self-sealing tree trunk notch generally centrally in said seal panel adapted to slip around and seal against a tree trunk of said tree when said seal panel is lowered to said generally horizontal position with said harvester sections in said harvesting position; said seal panels of said harvester sections adapted to overlap each other when in said horizontal position with said harvester sections in said harvesting position;

said first harvester section further including a panel subsection positioned generally centrally on said catch platform over at least said lower side of said catch platform, said panel subsection attached by at least one hinge to said harvester section adapted to allow pivotal raising and lowering of said panel subsection; said first harvester section further including a shaker apparatus pivotally attached to said frame generally underneath said hingedly attached panel subsection and at an elevation generally above said conveying means along said catch platform; said shaker apparatus further including vibratory mechanics attached thereto, said vibratory mechanics powered by said engine; a control means affixed adjacent said seat adapted to provide said operator control of said vibratory mechanics while sitting on said seat; said shaker apparatus further being attached to a movement actuating means powered by said engine adapted to provide pivotal lifting and lowering of said shaker apparatus, said pivotal lifting and lowering of said shaker apparatus further allowed by and adapted to cause lifting and lowering of said panel

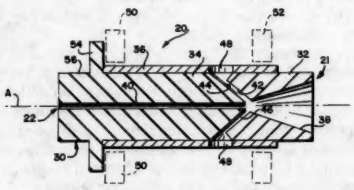
subsection; a control means affixed to said harvester section adjacent said seat adapted to provide said operator with control of said movement actuating means of said raising and lowering of said shaker apparatus; said shaker apparatus further including a shaker subsection having at least one shaker arm attached thereto and at least one pad affixed to a distal end of said shaker arm; said shaker subsection attached to said shaker apparatus with structuring adapted to provide movement of said shaker subsection toward and away from said seal panel whereby said shaker arm with said pad is moved toward and away from said tree; a movement actuating means attached to said shaker subsection and said first harvester section powered by said engine adapted to actuate said movement of said shaker arm toward and away from said tree; a control means affixed to said harvester section adjacent said seat adapted to provide said operator with control of said movement actuating means of said shaker subsection; said shaker arm and attached pad of said shaker apparatus with said harvester sections in said harvesting position adapted by way of both said position on said first harvester section and said movement capabilities of said shaker apparatus and shaker subsection to extend outward and upward to abut said trunk of said tree adjacent a main branch cluster above said seal panels and said produce conveying means in unobstructed view of said operator seating on said seat and vibrate said tree, said vibration of said tree adapted to cause said produce to fall onto said generally V-shaped catch platform, said sloping of said catch platforms adapted to cause said produce to fall onto said produce conveying means to be off-loaded into said at least one produce carrying structure.

4,986,066

VACUUM SPINNING NOZZLE ASSEMBLY

Elbert F. Morrison, Clarksville, Va., assignor to Burlington Industries, Inc., Greensboro, N.C.

Continuation of Ser. No. 286,293, Dec. 19, 1988, abandoned.
This application Feb. 22, 1990, Ser. No. 483,994
Int. Cl.[5] D01H *1/115*
U.S. Cl. 57—333 **29 Claims**



1. Apparatus for forming yarn comprising:

a housing;

an elongated shaft assembly mounted for rotation within said housing and having an inlet end and an outlet end, said shaft assembly further comprising first and second axially aligned sections relatively moveable toward and away from each other along an axis, at least one of said first and second axially aligned sections mounted for rotation about said axis within said housing;

an axial passageway extending through said first and second axially aligned sections;

a continuous, annular slot defined by opposed surfaces of said first and second sections and extending radially outwardly from said passageway, said slot having a width dimension adjustable by relative axial movement between said first and second sections; and

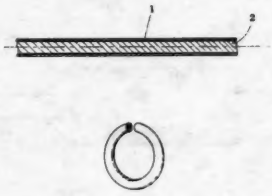
means for establishing an air flow radially outward through said annular slots.

4,986,067

PROCESS FOR THE PRODUCTION OF CHAINS AND OTHER ORNAMENTAL ITEMS MADE OF A LINED TUBE BAR AND OF SIMILAR OBJECTS

Gianfranco Caccialupi, 136 loc. Fossaccio, frz. Alberoro, 52048 Monte S. Savino, Arezzo (I), Italy

Filed May 23, 1989, Ser. No. 355,973
Claims priority, application Italy, Sep. 5, 1988, 1234 A/88
Int. Cl.[5] B21L *3/00*
U.S. Cl. 59—3 **2 Claims**



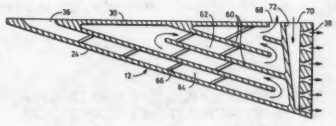
1. A process for the production of an ornamental chain, comprising producing a hollow metal copper alloy tube having an inside diameter, inserting in said hollow tube an elongated aluminum core of circular cross section having an outer diameter substantially smaller than the internal diameter of said tube, reducing the diameter of said tube until said tube is firmly bonded to the outer surface of said core, and forming the composite member thus produced into an ornamental chain.

4,986,068

HYPERSONIC SCRAMJET ENGINE FUEL INJECTOR

Ching-Pang Lee, Cincinnati; Kattalaicheri S. Venkataramani, Westchester; Daniel J. Laht, Cincinnati, all of Ohio, and Vincent H. Lee, Jupiter, Fla., assignors to General Electric Company, Cincinnati, Ohio

Division of Ser. No. 245,181, Sep. 16, 1988, Pat. No. 4,903,480.
This application Oct. 16, 1989, Ser. No. 421,912
Int. Cl.[5] F02K *7/10*
U.S. Cl. 60—270.1 **5 Claims**



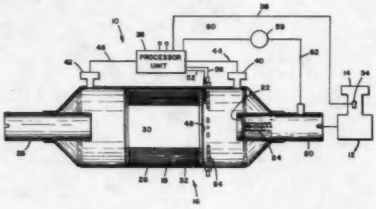
1. A hypersonic scramjet engine fuel injector comprising a housing having a generally horizontal top wall, an inclined bottom wall, and a generally vertical end wall attached together to define in cross section a generally right triangle, said housing also having two generally vertical side walls having a said-generally-right-triangle shape, said side walls attached to said top, bottom, and end walls to define a fuel-tight, generally right-triangular wedge, said top wall having a fuel inlet orifice distal said end wall, said end wall having a convergent-divergent fuel outlet nozzle; said fuel injector also comprising a plurality of spaced-apart interior walls disposed within said housing and connected to said side walls to define a fuel passageway having a serpentine-shaped cross section with a generally straight segment from said inlet orifice along a majority portion of said bottom wall.

4,986,069

ENGINE EXHAUST PARTICLE TRAP CAPTURED MASS SENSOR

Marty A. Barris, Lakeville, and Wayne M. Wagner, Apple Valley, both of Minn., assignors to Donaldson Company, Inc., Minneapolis, Minn.

Filed Aug. 29, 1989, Ser. No. 399,859
Int. Cl.[5] F01N 3/02
U.S. Cl. 60—274 2 Claims



1. Control apparatus for regeneration means for a ceramic filter placed in an exhaust stream of an engine, comprising:

first means for obtaining air mass flow rate into said engine;

second means for obtaining pressure drop across said ceramic filter;

third means for obtaining absolute temperature near an inlet end of said ceramic filter;

means for regenerating said ceramic filter when an initiation signal is received; and

means for processing said air mass flow rate, said pressure drop, and said absolute temperature from said first, second, and third obtaining means, respectively, said processing means including means for initiating said regenerating means when k is greater than a predetermined value where:

$$k = C\frac{\Delta P^x}{Q^y T^z}$$

where C=constant

ΔP=pressure drop obtained with said first obtaining means,

Q=air mass flow rate obtained with said second obtaining means, and

T=absolute temperature near inlet end of ceramic filter obtained with said third obtaining means, and

where x, y, and z have predetermined values in a range from 0.1 to 2.0.

4,986,070

PURGE CONTROL DEVICE FOR USE IN AN INTERNAL COMBUSTION ENGINE

Kazuo Abe, Susono, Japan, assignor to Toyota Jidosha kabushiki Kaisha, Toyota, Japan

Filed Mar. 9, 1989, Ser. No. 321,640
Claims priority, application Japan, Mar. 14, 1988, 63-32630[U]
Int. Cl.[5] F01N 3/28; F02M 33/02
U.S. Cl. 60—285 15 Claims

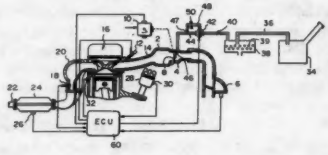
1. An internal combustion engine having an intake passage and an exhaust passage, comprising:

a charcoal canister for storing fuel vapor therein;

a catalyst arranged in the exhaust passage;

a determining means for determining whether or not a temperature of a bed of said catalyst is in a range substantially between 600° C. and 700° C. in which range hydrogen sulfide can be produced; and

a control means for controlling an amount of purge gas purged from said charcoal canister and fed into the intake passage in accordance with a determination by said determining means to reduce the amount of said purge gas only



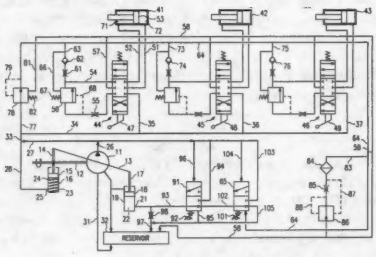
when said catalyst is in said range between 600° C. and 700° C.

4,986,071

FAST RESPONSE LOAD SENSE CONTROL SYSTEM

Dennis A. Voss, Mt. Prospect, and Gary A. Gruber, Elmhurst, both of Ill., assignors to Komatsu Dresser Company, Libertyville, Ill.

Filed Jun. 5, 1989, Ser. No. 361,217
Int. Cl.[5] F15B 13/12
U.S. Cl. 60—420 15 Claims



11. Apparatus comprising a source of pressurized hydraulic fluid having an outlet with a variable fluid output rate of said outlet responsive to the magnitude of fluid pressure applied to a control signal port of said control system,

at least one consumer device which consumes hydrostatic energy and has a fluid inlet, a consumer delivery line providing fluid communication between said outlet of said source of fluid and said fluid inlet of said consumer device, a process control valve operatively positioned in said consumer delivery line for selectively permitting or blocking fluid flow from said source of fluid through said consumer delivery line to said consumer device,

a load sense line providing fluid communication between said control signal port of said control system and said delivery line at a location between said process control valve and said consumer device to pass a pressure signal to said control signal port responsive to the load demand of said consumer device as represented by the pressure of the fluid at said location in said consumer delivery line,

a fluid receiver,

a first restricted bleed line providing fluid communication between said control signal port of said control system and said fluid receiver to bleed fluid from said control signal port and said load sense line into said fluid receiver,

a first fluid line providing fluid communication between said outlet of said source of fluid and said load sense line, and a pressure reducing valve operatively positioned in said first fluid line to pass fluid from said source of fluid into said load sense line whenever the pressure of the fluid in said load sense line is less than a predetermined value and to block the passage of fluid through said first fluid line to

said load sense line whenever the pressure of the fluid in said load sense line is greater than said predetermined value,

wherein said consumer device is one of a plurality of consumer devices, each having at least one fluid inlet; wherein said consumer delivery line is one of a plurality of consumer delivery lines, each being connected between said outlet of said source of fluid and a respective consumer device fluid inlet, each consumer delivery line having a process control valve operatively positioned therein for selectively permitting or blocking fluid flow therethrough from said outlet of said source of fluid to the respective consumer device fluid inlet; and wherein said load sense lien provides fluid communication between said control signal port and each of said plurality of consumer delivery lines at a location between the respective process control valve and the respective consumer device,

wherein said load sense line as a plurality of branches, with each branch being connected to a respective consumer delivery line, each of said branches containing a restriction and a check valve, and wherein said first fluid lien is connected to said load sense line downstream of said branches; and

wherein said control system comprises a control element for varying the fluid output rate from said outlet of said source of fluid, said control element having a control signal port,

a pilot valve having first and second control ports and first, second and third fluid ports, said pilot valve having a first position wherein said first fluid port is connected to said second fluid port and a second position wherein said first fluid port is connected to said third fluid port, said pilot valve being actuable between said first and second positions responsive to the difference in the pressures at said first and second control ports of said pilot valve, said second control port of said pilot valve being said control signal port of said control system,

a second fluid line connecting said control signal port of said control element to said first fluid port of said pilot valve to transmit fluid pressure between said first fluid port and said control signal port of said control element,

a third fluid lien connecting said outlet of said source of fluid to said second port of said pilot valve,

a fourth fluid line connecting said third fluid port of said pilot valve to said fluid receiver to pass fluid from said third fluid port into said fluid receiver,

a fifth fluid line connecting said outlet of said source of fluid to said first control port of said pilot valve, and

a second restricted bleed line connecting said control signal port of said control element and said fluid receiver to bleed fluid from said control signal port of said control element and said second fluid line into said fluid receiver.

4,986,072

HYDRAULIC ACTUATOR CIRCUIT WITH FLOW-JOINING CONTROL

Wataru Kubomoto, Hiroshima, Japan, assignor to Kabushiki Kaisha Kobe Seiko Sho, Kobe, Japan

Filed Aug. 31, 1989, Ser. No. 400,928

Int. Cl.[5] F15B *13/04*

U.S. Cl. 60—421 **4 Claims**

1. A hydraulic actuator control circuit capable of increasing the flow rate of a working fluid supplied to at least one hydraulic actuator, comprising:

a tank for containing the working fluid;

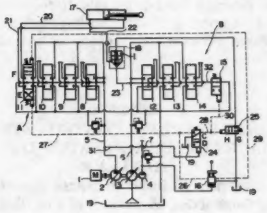
a first valve group comprising a plurality of hydraulic selector valves including at least one pilot controlled selector valve;

a second valve group comprising a normally closed logic valve moyable to open when a chamber thereof is exposed to the pressure in the tank, and a plurality of hydraulic selector valves including at least one pilot controlled selector valve;

a first hydraulic pump connected to fluid chambers of the hydraulic actuator via the first hydraulic valve group;

a second hydraulic pump connected to the second hydraulic valve group, and connected to one of the chambers of said actuator via said logic valve when said logic valve is open;

a two-port two-position valve provided in a line connected to the chamber of the logic valve, said two-port two-position valve being normally biased to a closed position to disconnect the line connected to the chamber of the logic valve from the tank, said two-port two-position valve including means for shifting said two-port two-position



valve to an open position by a pilot pressure applied to a pilot chamber thereof so as to connect the line connected to the chamber of the logic vale to the tank, whereby said second hydraulic pump is connected to said one of the chambers of said actuator; and

a pilot controlled selector vale normally biased to an open position to connect the pilot chamber of the two-port two-position valve to the tank, and having means for connecting the pilot chamber of the two-port two-position valve to an external pilot line having a pilot pressure when a pressure exceeding a predetermined value is applied to a pilot chamber of said pilot controlled selector valve.

4,986,073

AXLE DRIVING APPARATUS

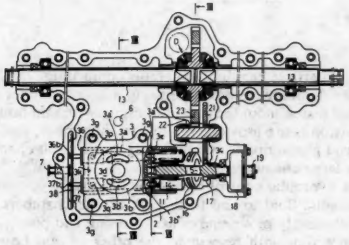
Hideaki Okada, Takarazuka, Japan, assignor to Kanzaki Kokyukoki Mfg. Co., Ltd., Amagasaki, Japan

Filed Feb. 1, 1989, Ser. No. 304,644

Claims priority, application Japan, Feb. 3, 1988, 63-24193; Mar. 9, 1988, 63-55828; Apr. 18, 1988, 63-51707[U]

Int. Cl.[5] F16D *39/00*

U.S. Cl. 60—454 **3 Claims**



1. An axle driving apparatus comprising:

a transmission casing, said transmission casing including an upper casing and a lower casing joined together to form an enclosed transmission;

a center section enclosed within said transmission casing, said center section supporting a hydraulic pump and a hydraulic motor;

a closed fluid path for transfer of fluid between said hydraulic pump and said hydraulic motor provided within said

center section, said closed fluid path being subjected to fluid pressure from said hydraulic pump to rotate said hydraulic motor;

a suction port provided at a lower surface of said center section along said closed fluid path for providing fluid from said transmission casing to said hydraulic pump for rotating said hydraulic motor;

first and second check valves disposed at an opening of said suction port, said check valves being simultaneously opened by a control means, wherein fluid within said closed fluid path is dischargeable from said center section through said check valves to an oil tank, and wherein said hydraulic motor is freely rotatable; and

means for filtering fluid from said transmission casing disposed at an opening of said suction port, said filter means being fitted between said center section and said lower casing.

4,986,074

HYDRAULIC CYLINDER CONTROL SYSTEM FOR GARBAGE COLLECTION TRUCK LIFT-DUMP HANDLER

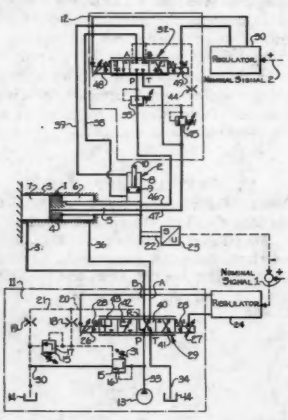
Wolfgang Hahmann, Kempen; Johannes Kirchhoff, Iserlohn, and Georg Sandkuhler, Hemer, all of Fed. Rep. of Germany, assignors to Barmag AG, Remscheid and Edelhoff Polytechnik GmbH & Co., Iserlohn, both of, Fed. Rep. of Germany

Filed Dec. 21, 1988, Ser. No. 287,029

Claims priority, application Fed. Rep. of Germany, Dec. 22, 1987, 3743564; Jan. 15, 1988, 3800990

Int. Cl.[5] B25J *9/14, 9/20*

U.S. Cl. 60—468 **21 Claims**



19. An article handling apparatus comprising

a first hydraulic drive comprising a housing and a differential piston mounted in said housing, with said housing and piston being movable relative to each other, and wherein said piston divides said housing into a small chamber and a large chamber,

first hydraulic control means for selectively conveying hydraulic fluid to and from each of said chambers so as to selectively move one of said housing and piston in either direction with respect to the other of said housing and piston,

a second hydraulic drive having two fluid receiving chambers for operating said second drive in opposite directions,

second hydraulic control means for selectively connecting said small chamber of said first hydraulic drive with either one of said chambers of said second hydraulic drive, and while connecting the large chamber of said first hydraulic drive with the other of said chambers of said second hydraulic drive, and

said second hydraulic control means comprises a first connecting line (46) connected to said small chamber of said first drive, a second connecting line (47) connected to said large chamber of said first drive, a first control line (39) connected to one of said chambers of said second drive, and a second control line (38) connected to the other of said chambers of said second drive, and valve means for selectively interconnecting said lines

(a) in an idle position wherein none of said lines are interconnected;

(b) in a first operating position wherein said first connecting line and said first control line are interconnected, and said second connecting line and said second control line are interconnected; and

(c) in a second operating position wherein said first connecting line and said second control line are interconnected, and said second connecting line and said first control line are interconnected, and

pressure balance means (35) positioned in said first connecting line and which is biased on one side by the pressure in said first connecting line at a location downstream of said balance means and upstream of said valve means, and which is biased on the other side by a spring and by the pressure in the one of said first and second control lines which is connected to said first connecting line in each of said first and second operating positions.

4,986,075

HYDRAULIC CIRCUIT FOR BACKHOE

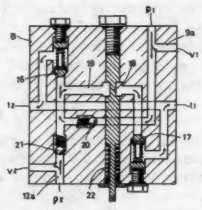
Shizuo Shimoie, Saikai, Japan, assignor to Kubota, Ltd., Osaka, Japan

Filed May 5, 1989, Ser. No. 347,730

Claims priority, application Japan, Jul. 26, 1988, 63-187872; Jul. 27, 1988, 63-99539[U]

Int. Cl.[5] F16D *31/02*

U.S. Cl. 60—468 **7 Claims**



1. A hydraulic circuit for a backhoe vehicle: comprising;

a first hydraulic pump (P1), a second hydraulic pump (P2) and a third hydraulic pump (P3) all driven by a same engine (E);

a pair of right and left vehicle propelling operating valves (V3) and (V5), with one valve (V3) or (V5) and an arm operating valve (V1) being connected with said first hydraulic pump (P1) via a first oil feed passage (9), with the other valve (V3) or (V5), a boom operating valve (V6) and a bucket operating valve (V7) being connected with said second hydraulic pump (P2) via a second oil feed passage (12); and

a swivel operating valve (V8) connected with said third hydraulic pump (P3);

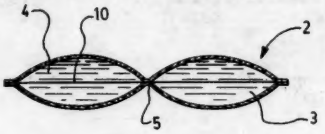
wherein said first oil feed passage (9) and said second oil feed passage (12) are connected with a same relief oil passage (19), said relief oil passage (19) including a high-pressure relief valve (16), a low-pressure relief valve (17) and a switch valve (18) for switching over a relief pressure of said relief oil passage (19) between a high pressure provided by said high-pressure relief valve (16) and a low pressure provided by said low-pressure relief valve (17).

4,986,076

ISOTHERMAL COOLING METHOD AND DEVICE

Kenneth Kirk, 27 Ancaster Ct., Dartmouth, Nova Scotia, Canada B2V 1J2 ; Cassius D. Remick, Waterloo, Canada; Charles M. Burns, and Berthold H. Habicher, both of Kitchener, Canada, assignors to Kenneth Kirk, Dartmouth, Canada

Filed Aug. 28, 1989, Ser. No. 398,936
Int. Cl.[5] F25D 5/00
U.S. Cl. 62—4 13 Claims



1. A method for cooling and maintaining an object at a constant temperature, comprising:

adding a salt that dissolves endothermically in water to a mixture containing at least water, a surfactant and an emulsified thermal buffer until a temperature near the freezing point of the thermal buffer has been reached and at least a partial phase change of the thermal buffer has occurred; and

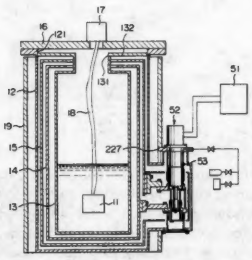
bringing the resulting mixture into direct or indirect contact with the object.

4,986,077

CRYOSTAT WITH CRYO-COOLER

Norihide Saho, Tsuchiura; Takeo Nemoto, Ibaraki, and Yoshihide Shizuoka, Hitachi, all of Japan, assignors to Hitachi, Ltd., Tokyo, Japan

Filed Jun. 20, 1990, Ser. No. 540,790
Int. Cl.[5] F25B 19/00
U.S. Cl. 62—51.1 11 Claims



1. A cryostat comprising:

a vacuum vessel;

partition means for air-tightly separating said vacuum vessel into a first vacuum chamber and a second vacuum chamber;

thermal shield means encapsulated within said first vacuum chamber;

a cooler encapsulated within said thermal shield means for containing therein a body to be cooled and cryogen for cooling said body to be cooled;

a cryo-cooler disposed outside of said vacuum vessel, said cryo-cooler having a cooling portion which portion is disposed within said second vacuum chamber;

a heat transfer passage along which heat is transferred from said thermal shield means to said cooling portion of said cryo-cooler through a part of said partition means;

at least two openings provided in said second vacuum chamber, through which said second vacuum chamber is capable of being opened to atmosphere; and

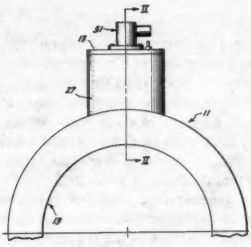
cover means detachably mounted to said respective openings for maintaining said second vacuum chamber at a vacuum condition, on which cover means said cryo-cooler is mounted.

4,986,078

REFRIGERATED MR MAGNET SUPPORT SYSTEM

Evangelos T. Laskaris, Schenectady, N.Y., assignor to General Electric Company, Schenectady, N.Y.

Filed Aug. 17, 1989, Ser. No. 395,637
Int. Cl.[5] F25B 19/00
U.S. Cl. 62—51.1 5 Claims



1. A superconductive magnet cooled by a two stage cryo-cooler comprising:

a vacuum vessel;

a magnet cartridge having at least one superconductive coil situated in the vacuum vessel;

a first stage heat station for removably thermally engaging the first stage of the cryocooler;

removably thermally engaging the second stage of the cryo-cooler, said second stage heat station in thermal and supporting contact with said magnet cartridge;

a thermal radiation shield surrounding said magnet cartridge, said shield spaced away from said vacuum vessel and the magnet cartridge said thermal radiation shield defining an aperture;

three concentric cylindrical tubes including an outer tube, an intermediate tube and an inner tube, said outer tube substantially enclosing said intermediate tue, said intermediate tube substantially enclosing said inner tube, each of said tubes having a first and second ends, said first and second heat stations situated inside said inner tube, said outer tube secured to said vacuum vessel at its first end and to said thermal radiation shield and first end of said intermediate tube at its second end, the second end of said intermediate tube being secured to the first end of said inner tube, the second end of said inner tube extending through the aperture in said thermal radiation shield and secured to said magnet cartridge;

spring bias means secured between second end of said intermediate tube and said first stage heat station for maintaining a constant pressure between the cryocooler first stage and the first stage heat station when the second stage of said cryocooler is forced in contact with the second stage heat station; and

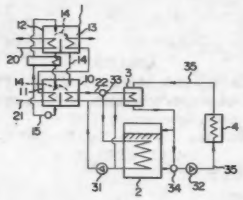
means for thermally connecting said thermal radiation shield to said first stage heat station.

4,986,079

APPARATUS AND METHOD OF GENERATING COLDNESS

Yasuo Koseki, Hitachiota; Akira Yamada, Hitachi; Hideaki Kurokawa, Hitachi; Isao Ohkouchi, Hitachi; Katsuya Ebara, Mito, and Sankichi Takahashi, Hitachi, all of Japan, assignors to Hitachi, Ltd., Tokyo, Japan

Filed Aug. 9, 1989, Ser. No. 391,083
Claims priority, application Japan, Aug. 12, 1988, 63-199892
Int. Cl.[5] F25D *3/00*
U.S. Cl. 62—59 10 Claims



4. A coldness generating method comprising the steps of:

arranging an absorption type refrigerator such that an evaporator thereof evaporates a first refrigerant, an absorbent in an absorber absorbs the thus-evaporated refrigerant steam, a regenerator heats and condenses the absorbent diluted by said refrigerant steam, and a condenser liquidizes said refrigerant steam evaporated due to the condensation so that coldness is generated;

providing a regenerating tank for regenerating coldness generated by said evaporator through second refrigerant;

circulating said coldness to the regenerating tank;

regenerating heat by forming ice or ice slurry in said regenerating tank; and

circulating said regenerated coldness to a radiator disposed outside a system so that said coldness is radiated,

wherein said first refrigerant circulating in said absorption type refrigerator to obtain the coldness and said second refrigerant introducing said coldness generated by said evaporator into said regenerating tank and then circulating said coldness in said regenerating tank consists essentially of refrigerant having a solidification temperature lower than the freezing point so that the coldness which is lower than the freezing point and which has been generated in said evaporator enables the regeneration in the form of the ice or ice slurry.

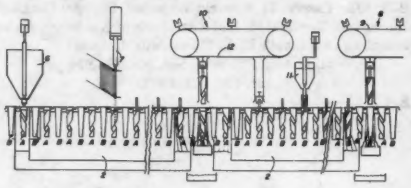
4,986,080

MACHINE FOR MAKING ICE CREAM AND WATER ICES HAVING TWO OR MORE CONCENTRIC OR ANYHOW COMBINED LAYERS, IN PARTICULAR ICE LOLLIES, AND A METHOD UTILIZING THE MACHINE

Franco Grigoli, and Franco Trabacchi, both of Milan, Italy, assignors to Sidam S.R.L., Cormano, Italy

Filed Dec. 28, 1989, Ser. No. 458,180
Claims priority, application Italy, Feb. 24, 1989, 19558 A/89
Int. Cl.[5] A23G *9/26*
U.S. Cl. 62—75 6 Claims

1. A machine for making double-flavor ices, in particular ice lollies, such as water ices and the like, comprising a freezing tank (2) through which parallel rows of molds (A, B) are intermittently advanced by means of a conveying chain (3), a first metering-filling unit (6) designed to fill the molds in a row of molds (A), a stick-inserting unit (7), and a final withdrawing unit (8), characterized in that each row of molds (A) is interposed between respective rows of molds (B), with the cross-section of a mold (A) being inscribable into the cross-section of a corresponding mold (B), and in that an intermediate withdrawing station (10) is provided at a location on freezing tank (2) intermediate to the stick-inserting unit (7) and the final



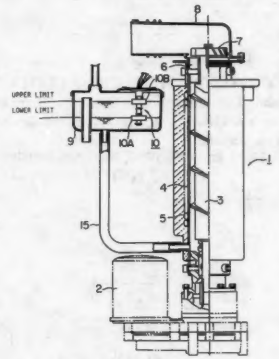
withdrawing unit (8) and is followed by a second metering-filling unit (11.)

4,986,081

ELECTRIC CONTROL APPARATUS FOR AUGER TYPE ICE MAKING MACHINE

Junichi Hida; Naoya Uchida, and Susumu Tatematsu, all of Nagoya, Japan, assignors to Hoshizaki Denki Kabushiki Kaisha, Toyoake, Japan

Filed Apr. 9, 1990, Ser. No. 506,040
Claims priority, application Japan, Apr. 7, 1989, 1-86727
Int. Cl.[5] F25C *1/00*
U.S. Cl. 62—130 4 Claims



1. An electric control apparatus for an auger type ice making machine having an auger mounted for rotary movement within an evaporator housing to which water is supplied from a water tank to cause ice crystals to form on an internal freezing surface of said evaporator housing, the electric control apparatus comprising:

a first water level detector disposed within said water tank to detect a level of water in said water tank for producing a first signal therefrom when the level of water has fallen to a lower limit level;

a second water level detector disposed within said water tank to detect the level of water in said water tank for producing a second signal therefrom when the level of water has risen up to an upper limit level;

a timer cooperable with said second water level detector for measuring a predetermined period of time in response to said second signal, the period of time being determined to correspond with a time interval defined by said first and second signals during normal operation of the ice making machine; and

means cooperable with said first water level detector and said timer for rendering the ice making machine inoperative when the predetermined period of time has been

measured by said timer before said first signal is applied thereto.

4,986,082

REFRIGERANT CHARGING SYSTEM IN WHICH A REFRIGERANT IS FRESHENED AND SMOOTHLY CHARGED INTO A STORAGE CONTAINER

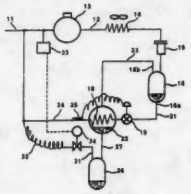
Keiichi Tomaru, Fujioka, Japan, assignor to Sanden Corporation, Gunma, Japan

Filed Dec. 21, 1989, Ser. No. 454,639

Claims priority, application Japan, Dec. 22, 1988, 63-322161; Dec. 22, 1988, 63-322163

Int. Cl.[5] F25B *43/00, 45/00*

U.S. Cl. 62—149 **10 Claims**



1. A refrigerant charging system for use in charging an object refrigerant which is produced from an original refrigerant into a storage container, said refrigerant charging system including receiving means for receiving said object refrigerant, cooling means coupled to said receiving means for cooling said object refrigerant to produce a modified refrigerant through the use of a cooling refrigerant, and sending means for sending said modified refrigerant to said storage container as said object refrigerant, wherein the improvement comprises:

processing means for processing said original refrigerant to produce a gaseous phase refrigerant segment and a liquid phase refrigerant segment;

first supplying means coupled to said processing means and said receiving means for supplying said gaseous phase refrigerant segment to said receiving means as said object refrigerant;

second supplying means coupled to said processing means and said cooling means for supplying said liquid phase refrigerant segment to said cooling means as said cooling refrigerant; and

controlling means coupled to said storage container for controlling the inner pressure of said storage container to facilitate charging of said modified refrigerant to said storage container.

4,986,083

FREEZER MACHINE

Nobutaka Naruse, Toyoake; Akihiko Hirano, Kariya, and Katsunobu Minari, Nagoya, all of Japan, assignors to Hoshizaki Denki Kabushiki Kaisha, Toyoake, Japan

Filed Mar. 1, 1990, Ser. No. 487,010

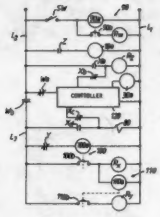
Claims priority, application Japan, Mar. 1, 1989, 1-49230

Int. Cl.[5] G05D *23/32*

U.S. Cl. 62—157 **2 Claims**

1. A freezer machine having a refrigeration system in the form of a circulation circuit including a compressor, a condenser, an evaporator coil arranged for thermal exchange with a freezing receptacle, and a solenoid valve of the normally closed type disposed within a bypass circuit of said circulation circuit to supply therethrough the hot gas outflowing from said compressor directly into said evaporator coil when it has been energized,

wherein an electric control circuit for the freezer machine comprises means for activating said compressor at least one time upon lapse of a predetermined period of time after said compressor has been deactivated and means for



energizing said solenoid valve in response to activation of the compressor.

4,986,084

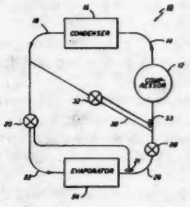
QUENCH EXPANSION VALVE REFRIGERATION CIRCUIT

Gerard F. Beckhusen, Liverpool, N.Y., assignor to Carrier Corporation, New York, N.Y.

Filed Jun. 20, 1988, Ser. No. 208,606

Int. Cl.[5] F25B *41/04*

U.S. Cl. 62—197 **3 Claims**



1. A closed refrigeration circuit containing refrigerant and serially including a compressor, a discharge line, a condenser, a liquid line, a thermal expansion valve, at least one distributor tube, an evaporator and a suction line connected to the compressor and containing suction modulation valve means;

said thermal expansion valve having sensing means for sensing superheat in said suction line upstream of said suction modulation valve means and for controlling said thermal expansion valve means responsive thereto;

a quench line connecting said liquid line to said suction line at a point in said suction line downstream of said suction modulation valve means;

a quench expansion valve in said quench line for controlling the flow of liquid refrigerant directly from said liquid line to said suction line; and

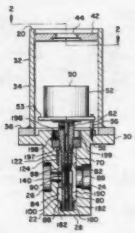
sensing means for sensing superheat in said suction line downstream of the point of connection of said quench line to said suction line whereby said quench expansion valve is controlled responsive to superheat in said suction line as supplied to said compressor.

4,986,085

INCREMENTAL ELECTRICALLY ACTUATED VALVE

James C. Tischer, La Crescent, Minn., assignor to American Standard Inc., New York, N.Y.

Filed Sep. 12, 1989, Ser. No. 406,218
Int. Cl.[5] F25B *41/04;* F16K *31/02*
U.S. Cl. 62—225 26 Claims



14. A refrigeration system for controllably circulating refrigerant in closed loop connection comprised of:

an evaporator for gasifying refrigerant;

a compressor in flow connection with said evaporator for receiving and compressing said gasified refrigerant;

a condenser in flow connection with said compressor for receiving and liquifying said refrigerant;

a variable flow rate expansion valve in flow connection with said condenser for receiving said liquified refrigerant and controllably expanding said refrigerant, said valve being in flow connection for directing said expanded refrigerant to said evaporator, said valve comprised of:

a valve body defining an internal metering chamber, said valve body having a first wall with an inlet aperture for permitting fluid flow into said metering chamber and a second wall including a substantially planar outlet surface with an outlet aperture for permitting fluid flow from said metering chamber;

a drive shaft disposed in said metering chamber;

means for rotationally supporting said drive shaft in substantial axial rigidity;

means for incrementally rotating said drive shaft;

a substantially rectilinear metering piston disposed in said metering chamber in sliding engagement with said planar outlet surface, said metering piston having a metering orifice; and

means for converting rotation of said drive shaft to linear movement of said metering piston, said converting means engaging said drive shaft and further engaging said metering piston;

means for sensing refrigerant condition in said refrigeration system; and

means for controllably incrementing said variable flow rate expansion valve in response to said means for sensing refrigerant condition.

4,986,086

CO_2 TEMPERATURE CONTROL SYSTEM FOR TRANSPORT VEHICLES

Bernard C. de Langavant, Westmount, Canada, assignor to Fridev Refrigeration Systems, Inc., Westmount, Canada

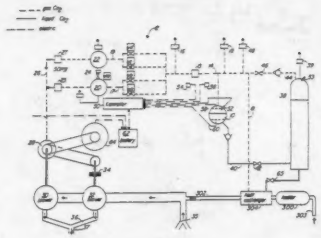
Filed Aug. 18, 1989, Ser. No. 395,801
Int. Cl.[5] B60H *1/32*
U.S. Cl. 62—239 33 Claims

1. A cooling system for an insulated enclosure, comprising,

an evaporator thermally coupled to said enclosure, said evaporator containing cryogen in liquid and gaseous phases, heat from said enclosure transferred to said evaporator causing cryogen therein to convert from said liquid to said gaseous phase which increases the pressure in said evaporator;

vent means coupled to said evaporator, said vent means being capable to assume opened and closed conditions, in said opened condition said vent means releasing gaseous cryogen from said evaporator to reduce the pressure therein, in said closed condition said vent means preventing release of cryogen from said evaporator;

control means for commanding said vent means to assume said opened and closed conditions at respective and predetermined vent opening and closing pressures of cryogen in



said evaporator, said control means constituting means for varying the pressure differential defined between said vent opening and closing pressures of cryogen in accordance with the heat absorption rate of said cooling system for regulating the rate of cryogen discharge from said evaporator in accordance with said heat absorption rate;

ventilation means for creating an air current in said enclosure, including:

(a) duct means for conveying air; and

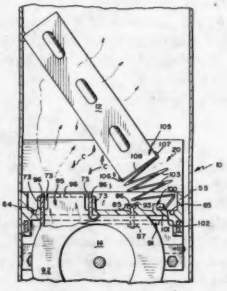
(b) gas powered fan means in said duct means to propel air therein, said vent means being coupled to said fan means for supplying thereto operating gaseous cryogen.

4,986,087

FAN COIL UNIT

John T. Sullivan, 3910 Madison St., Hyattsville, Md. 20781

Filed Dec. 1, 1989, Ser. No. 444,267
Int. Cl.[5] F25D *21/14*
U.S. Cl. 62—291 35 Claims



29. A fan coil unit comprising a primary pan, means for defining an air passage in said primary pan, a condensation coil positioned generally above said pan, fan means for directing air from an area below said primary pan through said air passage and to an area above said primary pan, a gap between a lower edge portion of said condensation coil and said primary pan, relatively thin flexible means for bridging said gap and generally preventing air from passing therethrough whereby air is

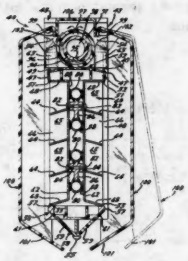
essentially forced to travel from the area above said primary pan to and through said condensation coil resulting in the formation of condensation upon said condensation coil and its collection by said primary pan, and clip means for releasably clip-securing said flexible bridging means to said primary pan.

4,986,088

EVAPORATOR DEVICE FOR ICE-MAKING APPARATUS

Kenneth L. Nelson, Albert Lea, Minn., assignor to Scotsman Group, Inc., Vernon Hills, Ill.

Division of Ser. No. 298,957, Jan. 19, 1989, Pat. No. 4,903,504.
This application Jan. 10, 1990, Ser. No. 463,262
Int. Cl.[5] F25C 1/12
U.S. Cl. 62—347 21 Claims



9. In an evaporator and ice-forming device for an ice-making machine having a water inlet adapted for fluid communication with a source of water, an evaporator tube adapted for fluid communication with a source of refrigerant, an ice-forming plate assembly disposed in closed heat transfer proximity with said evaporator tube, and water distribution means for distributing water from said water inlet to said ice-forming plate assembly, the improvement wherein:

said ice-forming plate assembly includes a pair of inner plate members each having inner sides disposed in close heat transfer proximity with said evaporator tube and each having a number of elongated openings extending therethrough, a number of generally horizontally-extending grid members serialiy spaced vertically along an outer side of each inner plate member, and a number of generally vertically-extending grid members serially spaced horizontally along said outer side of each inner plate member and interlockingly intersecting said vertically spaced horizontal grid members, said intersecting horizontal and vertical grid members extending laterally outwardly from said outer side of each inner plate member and intersecting one another to define the sides of a number of rows of open, outwardly-facing water-receiving recesses therebetween with said outer side of each inner plate member defining the floors of said water-receiving recesses, said vertical and horizontal grid members forming interlocking grid subassemblies on said outer side of each inner plate member, said grid subassemblies each having a number of laterally inwardly-protruding tabs thereon, said tabs extending through said elongated openings in the respective inner plate members and being bent over on the inner side of each inner plate member in order to interlockingly secure said horizontal and vertical grid members to said inner plate members and to form said ice-forming plate assembly, said horizontal and vertical grid members having complementary inwardly and outwardly-extending interlocking slots spaced apart therein along opposite inner and outer edges of said grid members generally at the intersections thereof, said interlocking slots in said horizontal grid members interlockingly receiving said intersecting vertical grid members, and said interlocking slots in said vertical grid members interlockingly receiving said horizontal grid members, said grid subassemblies each including water communication openings formed therein generally adjacent at least some of said intersections of said vertical and horizontal grid members in order to provide for a fluid communication between vertically adjacent rows of said water-receiving recesses, said interlocking slots in at least one of said vertical and horizontal grid members cooperating with said water communication openings for providing said fluid communication between said vertically adjacent rows of said water-receiving recesses, said ice-forming plate assembly being coated with a heat conductive coating after said grid subassemblies are secured to one another with said ice-forming plate therebetween;

said evaporator and ice-forming device further including a single common frame assembly generally surrounding and housing an edge area of said water distribution means, said grid subassemblies, and said evaporator tube, said common frame assembly being adapted for mounting said evaporator and ice-forming device in said ice-making machine, said common frame assembly being composed of a relatively heat insulating material, said common frame assembly further guiding the flow of water along said ice-forming plate assembly;

said water distribution means including a horizontally-extending inner water tube and a horizontally-extending outer water tube generally surrounding said inner water tube, said inner water tube being in sealed fluid communication with said water inlet, sealing means for sealing opposite ends of said inner and outer water tubes to one another, said inner and outer water tubes having an annular space therebetween disposed between said opposite sealed ends, said inner water tube having a number of generally vertically-extending inner tube openings spaced apart along its length for providing fluid communication between the interior of said inner water tube and said annular space, said inner tube openings being spaced apart on a lower side of said inner water tube, said outer water tube having a number of generally vertically-extending outer tube openings spaced apart along its length for providing fluid communication between said annular space and the exterior of said outer water tube, said outer tube opening being spaced apart on an upper side of said outer water tube, said water distribution means being adapted for providing fluid communication for water from said water inlet generally horizontally through said inner water tube, generally downwardly through said inner tube openings, and generally upwardly through said annular space on both opposite sides of said inner water tube to be discharged generally upwardly through said outer tube openings to both opposite sides of the exterior of said outer water tube, said water distribution means being disposed generally along and adjacent an upper generally horizontal edge of said evaporator plate assembly in order to allow water from said water distribution means to run therefrom and to flow along both outer sides of said ice-forming plate assembly into and out of said water-receiving recesses; and

said evaporator and ice-forming device further including a single common driplet member extending generally horizontally along a lower horizontal edge of said ice-forming plate assembly, said driplet member having a generally V-shaped configuration in its lateral cross-section with the apex of the V-shaped being disposed along the lower horizontal edge of said driplet member, said driplet member having side surfaces of the V-shaped configuration generally aligned with opposite sides of said ice-forming plate assembly for receiving water from said water-receving recesses running generally downwardly along the exterior of said legs, said driplet member converging said water at said apex and causing said water to fall therefrom, said common frame assembly for said ice-forming plate assembly including a lower horizontally-extending frame member extending along its lower horizontal edge, said

lower frame member having beveled upper edges on opposite sides of said lower horizontal edge of said ice-forming plate assembly, said beveled upper edges each sloping upwardly and inwardly toward said water-receiving recesses, said lower frame member further having inwardly and downwardly sloping opposite sides interconnecting said beveled upper edges and the upper horizontal edges of said legs of said V-shaped driplet member in order to facilitate the flow of water from said water-receiving recesses to the exterior side of said driplet member.

4,986,089

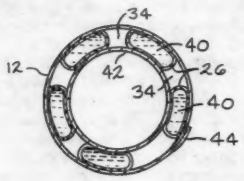
ADJUSTABLE REFRIGERATABLE BEVERAGE WRAP AROUND HOLDER

Reginald S. Raab, Middleville, Mich., assignor to Big Chill, Inc., Grand Rapids, Mich.

Filed Aug. 10, 1989, Ser. No. 391,979

Int. Cl.[5] F25D *3/08*

U.S. Cl. 62—457.4 **3 Claims**



1. An adjustable refrigeratable beverage container holder for wrapping around the exterior of a beverage container for chilling or maintaining a beverage in a chilled state before and during consumption, the improvement comprising:

an outer belt of insulative material having an interior surface with longitudinal edges, said belt having fastening means enabling said holder to adjustably wrap and fasten circumferentially around beverage containers of varying sizes;

a network of individual packets being substantially rectangular and pillow in shape and having freezable fluid disposed therein, said packets being of plastic sheeting sealed at opposing ends to retain said freezable fluid therein and having flange regions extending integrally from said sealed ends, said flange regions being fixably attached to said longitudinal edges of said interior surface so as to position said packets periodically and transversely to the length of said belt in a side-by-side relation with intervening areas permitting said belt to bend at said areas and form a generally tubular enclosure for receiving said beverage container; and

rectangular strips of insulative material being fixably attached over said flange regions to said longitudinal edges of said interior surface of said belt and retentively securing said packets between said belt and said rectangular strips, said rectangular strips and said packets being in surface to surface contact with said exterior of said beverage container to chill and insulate the contents thereof, said rectangular strips also insulating said packets from ambient temperatures when said holder is wrapped around said beverage container.

4,986,090

METHOD OF KNITTING

Victor J. Lombardi, 2715 Charlotte La., Burlington, N.C. 27215

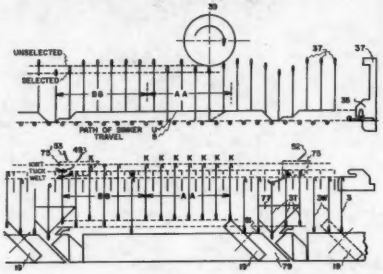
Division of Ser. No. 348,522, Feb. 12, 1982, abandoned. This application Jun. 23, 1988, Ser. No. 225,676

Int. Cl.[5] D04B *9/12*

U.S. Cl. 66—9 R **11 Claims**

1. A method of knitting a decorative fabric on a circular knitting machine having continuously operating pattern wheels for independent sinker selection operative at a single level with said pattern wheels cooperating with a full complement of sinker elements extending around the entire circumference of the sinker dial of said machine for selectively activating sinkers between first retracted non-terry loops forming positions in which the nibs of said sinker elements are out of the path of the yarn caught in the hooks of needles on opposite sides thereof and second advanced terry loop forming positions in which the nibs of the sinkers are in the path of the hooks of needles on opposite sides thereof, and continuously operating pattern wheels for independent needles selection on the full complement of needles for selectively activating needles to a plurality of different heights, and a plurality of feeds, said method comprising the steps of:

(a) introducing in at least one of said plurality of feeds at least a first ground yarn at substantially a sinker throat level and at least a second yarn at a higher level above the nibs of the sinkers;



(b) selectively advancing at the same ones of said feeds selected ones of said sinkers according to a prescribed pattern to said second advanced terry loop forming positions in selected areas of said decorative fabric; and simultaneously;

(c) selectively advancing at the same ones of said feeds selected ones of said needles to knit height in the said selected areas of said decorative fabric in cooperate with said selected sinkers in the same said selected areas in forming elongated or terry loops over the nibs of said sinkers selectively advanced in said selected areas; and

(d) selectively maintaining at the same ones of said feeds selected ones of said sinkers in retracted non-terry loop forming positions in areas complementary to said selected areas while simultaneously and selectively advancing cooperating needles to a plurality of different positions to form knit, tuck, and welt stitch combinations with at least one of said first yarn and at least a second yarn in said areas complementary to said selected areas.

4,986,091

PROCESS AND WARP KNITTING MACHINE FOR THE PRODUCTION OF PILE WARE

Horst Jager, Heusenstamm, Fed. Rep. of Germany, assignor to Karl Mayer Textilmaschinenfabrik, Fed. Rep. of Germany

Filed Aug. 7, 1989, Ser. No. 390,968

Claims priority, application Fed. Rep. of Germany, Nov. 8, 1988, 3827265

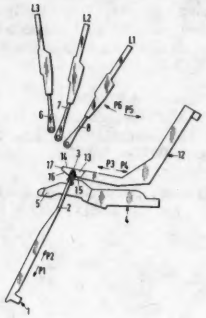
Int. Cl.[5] D04B *23/22*

U.S. Cl. 66—84 R **15 Claims**

1. A process for the manufacture of pile ware with pile threads and base threads on a warp knitting machine having pile sinkers and a single needle bar with needles having needle backs, the process contemporaneously laying the base threads and the pile threads about the needles and comprising the steps of:

swinging the base and pile threads from an underlap into an overlap position, laying first the base threads and then the pile threads onto the needle backs;

sliding upon said needle backs said base and pile threads with a separation between them; and



moving the pile sinkers into the thread space formed between said base and pile threads during the swinging step in a reciprocating manner with a component of motion in a direction parallel to the upward motion of the needles, said pile sinkers remaining in said space until stitch knock-over occurs.

4,986,092

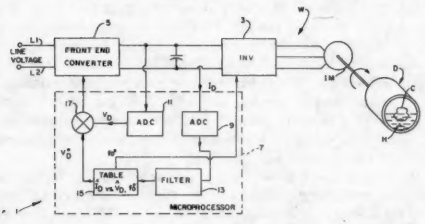
SPEED CONTROL FOR INVERTER DRIVEN WASHING MACHINE

Pradeep K. Sood, and John S. Thorn, both of St. Louis County, Mo., assignors to Emerson Electric Co., St. Louis, Mo.

Filed Apr. 12, 1989, Ser. No. 336,886

Int. Cl.[5] D06F *33/02*

U.S. Cl. 68—12.00 R **11 Claims**



5. In a washing machine having a rotatable washing drum for holding items to be washed and water for washing the items, an induction motor for rotatably driving the drum, said induction motor being powered by an inverter, the rotating speed of the drum at any one time tending to be dependent upon the number of items being washed and the amount of water in the drum at that time, the improvement comprising speed control means for regulating the drum speed within a preselected speed range, said speed control means including means for sensing the inverter voltage, means for sensing the inverter current, and speed maintaining means responsive solely to the inverter current and the inverter voltage and frequency to maintain the drum speed within the selected range, the inverter current sensing means having an analog output, analog-to-digital converting means for converting said analog output to a digital output and for supplying the digital output to the speed maintaining means, the inverter voltage sensing means having an analog output, further including second analog-to-digital converting means for converting the analog output representing the inverter voltage to a digital output representing the inverter voltage and for supplying the digital output representing the inverter voltage to the speed maintaining means.

4,986,093

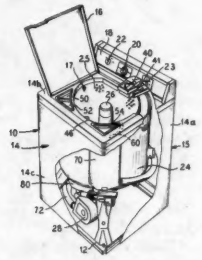
FLUID RECIRCULATION SYSTEM FOR AN AUTOMATIC WASHER

Jim J. Pastryk, Weesaw Township, Berrien County; Nihat O. Cur, St. Joseph Township, Berrien County; Anthony H. Hardaway, Lincoln Township, Berrien County, and John W. Euler, St. Joseph, Berrien County, all of Mich., assignors to Whirlpool Corporation, Benton Harbor, Mich.

Filed Jan. 5, 1990, Ser. No. 461,410

Int. Cl.[5] D06F *39/02, 39/08*

U.S. Cl. 68—13 R **15 Claims**



6. A fluid recirculation system for an automatic washer comprising:

a collection zone for wash liquid;

a pump having a suction inlet communicating via a first fluid conduit with said collection zone;

a recirculation nozzle selectively communicating with a discharge outlet of said pump via a second fluid conduit;

a mixing zone for receiving a supply of detergent and fresh water, said mixing zone having an outlet selectively communicating with said suction inlet via a third fluid conduit and an inlet selectively communicating with a discharge outlet of said pump via a fourth fluid conduit; and

sensing means associated with said collection zone for sensing the presence of wash liquid within said collection zone; and

control means for admitting wash liquid to said wash zone in response to a predetermined condition of said sensing means.

4,986,094

APPARATUS FOR DYEING OR OTHERWISE TREATING AN ELONGATE FABRIC MATERIAL

Mitsugu Umino, Uozu, and Kiyoshi Nakayama, Kurobe, both of Japan, assignors to Yoshida Kogyo K.K., Tokyo, Japan

Filed Dec. 11, 1989, Ser. No. 448,640

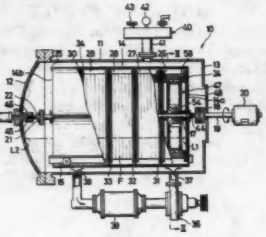
Claims priority, application Japan, Dec. 16, 1988, 63-318929; Dec. 22, 1988, 63-323989

Int. Cl.[5] D06B *17/04, 23/04*

U.S. Cl. 68—27 **6 Claims**

1. A dyeing apparatus for dyeing or otherwise treating an elongate fabric material including slide fastener stringers which comprises a horizontally mounted cylindrical vessel provided at one end with a removable end cover and at the opposite end with a vertical end wall, cylindrical beam concentrically mounted within said vessel and removable therefrom, a driven shaft extending axially and centrally through said beam, a first motor adapted to rotate said driven shaft, a second motor operatively connected to means for moving said driven shaft axially toward and away from said first motor, a

plurality of partition walls disposed in spaced parallel relation and separating said beam into a plurality of independent dye chambers, a dye frame unit disposed adjacent said vessel and having a pair of spaced parallel support rims and a pair of spaced parallel arm assemblies each having a plurality of



equally spaced arms, and a cam lever connected via a hub to said driven shaft and to said frame unit so as to be movable radially toward and away from said driven shaft to adjust the overall diameter of said dye frame unit on which is mounted a fabric material.

4,986,095

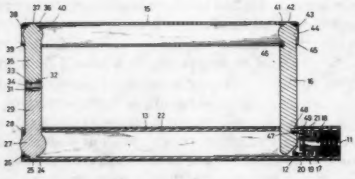
RETRACTABLE LOCK STRUCTURE

Chao-Jen Chou, and Teng-Yun Wang, both of P.O. Box 96-405, Taipei 10098, Taiwan

Filed Aug. 27, 1990, Ser. No. 573,380

Int. Cl.[5] E05B *73/00*

U.S. Cl. 70—18 **1 Claim**



1. A new retractable lock structure mainly comprising:

a first pipe section, of which one end is mounted with a lock cylinder; and said lock cylinder being connected together in a flexible manner; and the other end of said first pipe section having a spheric opening of which one side having guide slot; a positioning hole being provided on the opposite side of said guide slot; and said first pipe section being pivotally connected with one end of a connecting rod;

a connecting rod including two stem parts, of which both ends have two ball-shaped parts with positioning studs respectively; and said ends being mounted in spheric openings on the ends of said first pipe section and a second pipe section;

a second pipe section being a hollow pipe, of which both ends have two spheric openings and two guide slots respectively; and a positioning hole being provided at the opposite side guide slot; and one end of said second pipe section being connected with one end of said connecting rod, while the other end being connected with one end of a locking rod;

a locking rod having a ball-shaped part with a positioning stud on one end thereof; and a positioning channel being furnished between said ball-shaped part and said locking rod; and the other end of said locking rod being formed into a slanting point with a round lock groove; and

said first and second pipe sections being hollow pipes, and said first pipe section being used as a casing to accommodate said connecting rod and said second pipe section; and said second pipe section being used as a casing to accommodate said connecting rod and said locking rod upon the locking being recovered and put in storage condition; and the ends of said second and first pipe sections being provided with spheric openings respectively so as to facilitate said ball-shaped parts on said connecting rod and said locking rod to connect and engage thereto respectively.

4,986,096

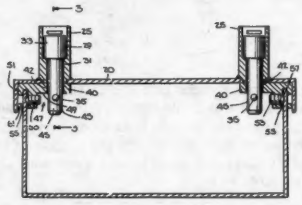
ACCESS COVER SECURITY DEVICE

William Soehner, 135 Oceanview Rd., East Rockaway, N.Y. 11518, and Edward Wilber, 346 Fern St., South Hempstead, both of N.Y. 11550

Filed Sep. 7, 1989, Ser. No. 404,096

Int. Cl.[5] B65D *55/14*

U.S. Cl. 70—54 **22 Claims**



1. Apparatus for securely locking an access cover to a housing, the housing defining an interior volume, comprising:

a bracket adapted to be attached at a point substantially within the interior volume of the housing, the bracket including fastening means inaccessible from the exterior of the housing once the access cover is mounted to the housing, said bracket comprising an L-shaped bracket having a first leg disposed at least partly within the interior volume of the housing and having an aperture disposed in the first leg for receiving the fastening means, the fastening means comprising a screw having an end for engaging a wall of said housing thereby securing said bracket to said housing, a second leg of the bracket disposed within the interior volume of the housing and extending into said volume having a bore for receiving a lock, said screw being received in said first leg in said aperture between said bore and said wall of said housing;

the access cover defining a plane and including a member disposed thereon having a bore therein defining a longitudinal extent, the longitudinal extent of the bore disposed substantially perpendicularly to the plane of the access cover, the bore of the member adapted to receive a lock having locking means thereon, the lock further being received in the bore of the second leg of the bracket in alignment with the bore of the member once the access cover is mounted to the housing, the locking means being received on a side of the second leg of the bracket opposite the member and securing the access cover to the bracket.

4,986,097

TANK FILLER TUBE LOCK

Jay S. Derman, 1201 N. Catalina Ave., P.O. Box 949, Redondo Beach, Calif. 90277

Filed Jul. 9, 1990, Ser. No. 550,188

Int. Cl.[5] B65D *55/14*

U.S. Cl. 70—158 **16 Claims**

1. In combination with a tank filler tube,

a locking device comprising:

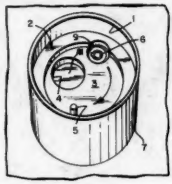
sleeve means for insertion in said tank filler tube, and defin-

ing a tube inside wall to provide slidable sealing engagement with said tube inside wall;

annular collar means, sized for slidable insertion into said sleeve means; said annular collar means having a threaded portion of its inside diameter surface located adjacent to its top surface; said inside diameter surface being stepped to a smaller diameter below said threaded portion, providing a retaining surface; said annular collar means having a first hole bored axially adjacent to said inside diameter edge for the purpose of accommodating a locking element;

a first disk member, having a threaded circumferenced edge and sized to fit the inside diameter of said annular collar means; said first disk member containing an off-center located opening which is large enough to accept a filler hose nozzle;

a second disk member which is sized to fit the inside diameter of said annular collar means, and being located beneath said first disk member, resting upon said stepped retaining



surface; said second disk member containing an off-center located opening which is large enough to accept a filler hose nozzle; and

a locking element, including a cylindrical lock, which is located in said first hole bored through said annular collar means, and normally, in its locking position, extending through the inside edge of said annular collar means and through the outside edges of said first disk member and second disk member to prevent rotation of said disks about their axis; said cylindrical lock, when unlocked by insertion and rotation of a key, able to be pushed downwards to an unlocked position;

said off-center openings in each said disk capable of being aligned in open configuration or misaligned in closed configuration; said locking element being adapted to unlock and thereby disengage for rotation about its axis said first disk, permitting said off-center openings in said disks to become aligned, thus allowing said tank filler tube to be utilized for filling purposes.

4,986,098

VEHICLE DOOR LATCHES AND LOCKING MECHNAISM

Sidney E. Fisher, Solihull, England, assignor to Rockwell Automotive Body Components (UK) Ltd., United Kingdom

Filed Aug. 5, 1988, Ser. No. 229,058

Claims priority, application United Kingdom, Aug. 7, 1987, 8718710

Int. Cl.[5] E05B *53/00*

U.S. Cl. 70—262 **12 Claims**

1. A vehicle door latch assembly, comprising:

(a) a latch bolt for interaction with a striker formation of an associated door frame in use, the bolt in a latched position keeping the door fully closed;

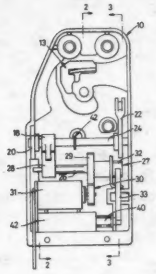
(b) retention means cooperating with the bolt to secure it at the latched position;

(c) release means connected to interior and exterior door handles or other operating means in use to actuate the retention means for freeing the bolt to allow the door to open, said release means including a locking dog displaceable between an active position at which it drivingly connects said operating means for movement of the retention means and an inactive position at which the operating means is disconnected from the retention means;

(d) locking mechanism comprising locking means which when in a locked condition disables the release means to prevent actuation of the retention means by attempted operation of at least the exterior door handle or other exterior operating means in use, said locking means including:

(i) a rotatably driven worm shaft and a worm nut in threaded engagement therewith, displacement of the nut along the shaft carrying said dog between the active and inactive positions;

(ii) a crank element fulcrummed for selective angular movement about a first axis to a first angular position at



which the locking means is not in the locked condition and to second and third angular positions at both of which the locking means is in the locked condition, and

(iii) a linkage having pivotal connection to the crank element on a second axis spaced from the first axis for effecting said angular movement of the crank element manually; and

(e) deadlocking means selectively operable to cause the crank element to take up the third angular position, the first and second axes being substantially in line with the direction of operative movement of the linkage at the latter position whereby the linkage cannot be used to effect angular movement of the crank element from that position to return the locking means to unlocked condition.

4,986,099

LOCK SYSTEM AND LOCK HAVING TWO ELECTRONIC CONTROL SYSTEMS

Michael F. Johnson; Lyn M. Roberts, both of London, and David E. Cooper, Surrey, all of England, assignors to Lynx Business Machines Limited, London, England

Continuation of Ser. No. 199,388, May 27, 1988, abandoned. This application Nov. 30, 1989, Ser. No. 443,877

Claims priority, application United Kingdom, Jun. 1, 1987, 8712805

Int. Cl.[5] E05B *49/02*

U.S. Cl. 70—277 **8 Claims**

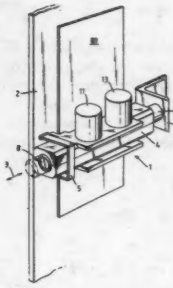
1. A lock system comprising:

a lock comprising a lock member support and a lock member mounted upon said lock member support, said lock being mounted to a lock support member;

a first electronic control system including a first electronically driven motor, and being operatively associated with the lock to unlock the lock when a valid code is entered into said first electronic control system, said lock member being movable relative to said lock member support between locked and unlocked positions upon actuation of said lock by said first electronic control system; and

a second electronic control system including a second elec-

tronically driven motor and being independently connected to said lock and adapted to unlock said lock independently of said first electronic control system when an override code is entered into said second electronic control system, said lock member support being movable relative to said lock support member in response to actuation by said second electronic control system thereby to cause said lock member to move between its locked and unlocked positions.



4,986,100

KEY USING A SYNTHETIC RESIN BOW

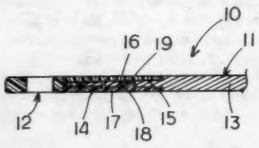
Masaji Terada, 2-2-403, Atago 2 chome, Kokurakita-ku, Kitakyushu-shi, Japan

Filed Nov. 29, 1989, Ser. No. 442,816

Claims priority, application Japan, May 15, 1989, 1-156062[U]

Int. Cl.[5] E05B *19/00*

U.S. Cl. 70—395 **2 Claims**



1. A key having a synthetic resin bow, comprising:

a metal key body comprising a blade section on which serrations are to be formed and an inserting section connected to said blade section, wherein said inserting section is thinner than said blade section, and

wherein said synthetic resin bow is non-monably fixed to and completely surrounds the inserting of said key body and has a a thichness within 0.9 and 1.3 times that of said blade section.

4,986,101

PROCESS AND APPARATUS FOR REFORMING BRAKE SHOES

Steven J. Starner, Hartford, Mich., assignor to Eaton Corporation, Cleveland, Ohio

Filed May 25, 1990, Ser. No. 528,522

Int. Cl.[5] B21D *5/01*

U.S. Cl. 72—10 **10 Claims**

1. A process for reforming an arcuate brake shoe having openings at opposite ends thereof to within established dimensional limit standards, said process including the steps of:

(a) providing a storage bank of retrievable dimensional limit standards for at least one type of brake shoe to subjected to the reforming process;

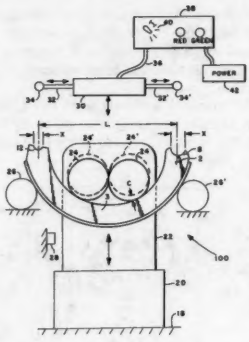
(b) supporting opposite ends of the brake shoe on spaced-apart support members;

(c) providing a bending member operative to engage and bend the brake shoes transversely between the supports in response to a control signal;

(d) providing an adjustable sensing member operative to extend and retract sufficiently to enable respective engagement portions thereof to rest in the brake shoe openings and cause the sensing member to provide a reference signal indicative of the distance therebetween;

(e) comparing the reference signal to the selected dimensional limit standards established therefor; and

(f) providing the control signal operative to cause the bending member to bend the brake shoe transversely between the supports until the brake shoe configuration is brought within the dimensional limit standards established therefor.



4,986,102

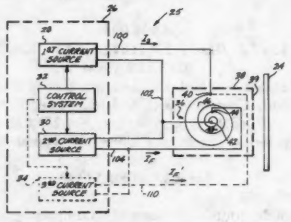
ELECTROMAGNETIC DENT REMOVER WITH TAPPED WORK COIL

I. Glen Hendrickson, and Karl A. Hansen, both of Seattle, Wash., assignors to The Boeing Company, Seattle, Wash.

Filed May 23, 1989, Ser. No. 355,563

Int. Cl.[5] B21D *26/14*

U.S. Cl. 72—56 **26 Claims**



1. An electromagnetic dent remover for electromagnetically removing dents from conductive materials comprising:

(a) power source means for producing: a first pulse, said first pulse having a predetermined polarity and rise time; and, a second pulse, said second pulse having a polarity opposite to said predetermined polarity of said first pulse and a rise time shorter than said rise time of said first pulse;

(b) a dent removal head including an electric coil having an electromagnetic stabilizing section coupled to said power

source means for receiving said first pulse and stabilizing a conductive part and an electromagnetic dent removal section coupled to said power source means for receiving said second pulse, and removing a dent from the conductive part; and,

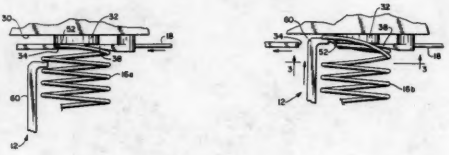
(c) control means coupled to said power supply means for causing said power supply means to apply said first pulse to said electromagnetic stabilizing section of said electric coil at a first time and said second pulse to said electric coil at said second time subsequent to said first time.

4,986,103

APPARATUS FOR COILING SPRINGS WITH TUCKED ENDS

D. John Jacobson, Southington, Conn., assignor to Newcomb Spring Corp., Southington, Conn.

Filed May 8, 1990, Ser. No. 520,634
Int. Cl.[5] B21F *3/02, 35/02*
U.S. Cl. 72—137 **12 Claims**



1. A spring coiling machine comprising:

a form arbor;

a block wire guide in close spaced relationship to the form arbor;

a coiling point in close side spaced relation to the form arbor;

a pitch tool in close side spaced relation to the form arbor generally opposite the coiling point;

feeding means for feeding a supply of wire between the wire guide and the form arbor and between the coiling point and the form arbor against the pitch tool such that during said feeding the wire is deformed into a coil having a leading end and a trailing end with a continuous series of generally helical loops being continuously formed in order from the leading end to the trailing end;

engagement means for fixable engagement by the trailing end of said coil;

slider means selectively activatable for engagement with the said coil to force the coil against said engagement means so that a last formed loop is forwardly positioned between a next to last formed loop and the leading end of said coil; and

cutter means for severing the coil from the supply of wire;

wherein the trailing end of said coil is tucked by cooperation of said slider means and engagement means and the coil is severed by said cutter means to provide a helical coil spring having a tucked trailing end.

4,986,104

PORTABLE PIPE-BINDING MINIMACHINE

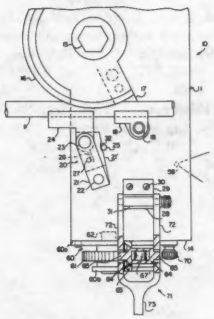
Alessandro Caporusso, and Mario Caporusso, Via Pantanelle, 21, Piedimonte San Germano, Frosinone, Italy

Filed Jul. 7, 1989, Ser. No. 376,605
Claims priority, application Italy, Jul. 19, 1988, 48207 A/88
Int. Cl.[5] B21D *7/04*
U.S. Cl. 72—158 **3 Claims**

1. In a portable pipe-bending mini-machine comprising a box-like main body which incorporates a gear drive for either manual or motor control of a matrix-carrying shaft, the latter being provided with an auxiliary device that engages and disengages said shaft, and with gears that reverse the rotation of a matrix in both the manual and motor control modes, and in which an interchangeable countermatrix is mounted on a special revolving support, the countermatrix having a groove therein; the improvement which comprises:

a box-like main body (11) having a lower part (12) containing a gear drive (40) and having a front wall (14) adapted to mount either a motor (90) if the gear drive (40) is to be motor driven, or a support (60) for manual control;

said gear drive (40) comprising two longitudinal parallel shafts (95) and (43), a first one of which is used to accomplish motor control by means of said motor (90) and an associated pinion gear (93), and a second one to accomplish manual control by means of a lever (60), said motor (90) rotating said first shaft (95) along with gear wheels (94, 96, 97) mounted on it, of which one said gear wheel (94) can be driven by a pinion gear (93) of said motor (90) in the case of manual control, or by said first shaft (95) when it is coaxially coupled with a ratchet wheel (61) which is intermittently rotated by a pawl (66) engaging teeth of said ratchet wheel (61) under manual control of said lever (71); said shaft (43) being driven to rotate by said shaft (95) through either one of a pair of gear wheels (54, 55) integrated to form a reverse gear (53) mounted on sid second shaft (43) and locked to it by a key (52), one said gear wheel (54) meshing directly with a respective gear wheel (96) of said first shaft (95), whereas a gear



wheel (55) of said reverse gear assembly meshes indirectly with a respective gear wheel (97) of said first shaft (95) through an intermediate gear (98) to reverse the rotation of said second shaft (43) and at the same time the direction of pipe travel, the latter shaft being provided with a worm gear (42) meshing with a respective helical gear (41) whose axis of rotation is the same as that of a main matrix-carrying shaft (16); said worm gear (42) forming a single unit with one jaw (46) of a clutch (46–48) which is held firmly in an engaged position by means of a compression coil spring (50), said jaw (46) of clutch (46–48) being maintained, together with said worm gear (42), in a predetermined position by means of a member (47), and being able to freely rotation on said second shaft (43) when it is disengaged from the other said jaw (48), the latter, on the contrary, causing the second shaft (43) to rotate with it as it is locked to the second shaft by means of key (51); said reverse gear (53) being able to slide along said second shaft (43) under the control of a longitudinal axis lever (56) pivoted on (58) and operated by means of end pins (57);

a matrix-countermatrix combination (16, 24) of which said matrix (16) has a half-round groove, and said countermatrix (24) has a confronting groove, a body of said countermatrix being located and revolving between flat parallel arms (21, 21') of a support (20) mounted and revolving on

a pin (22) projecting from a top surface of said main body (11), said support (20) allowing the mounting of said interchangeable countermatrix (24) and the positioning of said confronting groove (24') at the start of a bending operation, angular movement of said countermatrix (24) being restricted by a projection thereof (26) striking against pin (27) of said support (20), while angular movement of the latter is restricted by a pin (25) similarly projecting from a top surface of said main body (11), and

a manual control device assembly (60) for said mini-machine (10) comprising a channel section support fastened to said front wall (14) of said main body (11) through two flat parallel surfaces (60a, 60b) and providing room for the mounting between said surfaces of said ratchet wheel (61) whose hub (62) is shaped to be inserted into a mating blind hole at an external end of said first shaft (95) of said gear drive (40), said channel section support being provided with a top projection (63) having a dovetail bottom wall in which slides a piece (64) in whose recess a pawl (67') is pivoted, and is provided with opposed projecting pins (65, 65) housed in slots (66, 66) of arms (72) of a fork-like lever (71), to allow said pawl (67') to engage teeth of said ratchet wheel (61) to impart consecutive intermittent angular movements to the ratchet wheel and consequently to matrix (16) through said gear drive (40).

4,986,105

MACHINE FOR CORRUGATING SHEET METAL OR THE LIKE

Nils G. Höglund, Bjästa, Sweden, assignor to Aktiebolaget Br. Hoglunds Maskinuthyrning, Kopmanholmen, Sweden

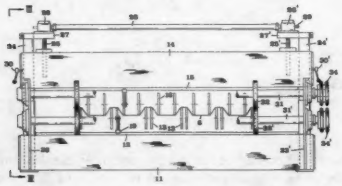
PCT No. PCT/SE87/00354, § 371 Date Feb. 13, 1989, § 102(e) Date Feb. 13, 1989, PCT Pub. No. WO88/01208, PCT Pub. Date Feb. 25, 1988

PCT Filed Aug. 6, 1987, Ser. No. 312,705

Claims priority, application Sweden, Aug. 15, 1986, 8603433

Int. Cl.[5] B21D *5/14*

U.S. Cl. 72—180 **5 Claims**



1. A machine for corrugating sheet material, so as to provide a corrugated sheet having an upper flange forming a part of a corrugation and a lower flange forming a part of a corrugation comprising a plurality of successive working stations each provided with a corrugating device having upper and lower rotatable corrugating means adapted to jointly provide corrugations of successively increasing depth in a sheet which is successively advanced through the machine from a front station toward a rear station, wherein each corrugating device includes a plurality of spaced apart thin or disc-shaped rollers which are individually rotatable and adjustably movable in the direction of the axes of rotation and also lockable at desired spaced apart locations, wherein said plurality of rollers are formed into a set, each set comprising a pair of spaced rollers at the upper corrugating means and a corresponding cooperating pair of spaced rollers at the lower corrugating means with one of said pair of rollers of said upper or lower corrugating means being located between the other of said pair of rollers of said upper or lower corrugating means, one of said pairs of rollers of the upper or the lower corrugating means being spaced apart a distance greater than the other of said pair of rollers whereby a pair of adjacent rollers of an upper corrugating means determine the shape or width of a lower flange of the metal sheet and simultaneously a pair of adjacent rollers of the lower corrugating means determine the shape or width of an upper flange of said sheet, each roller being rotatably mounted on a separate holder which can be adjusted and locked in different positions along a guide which extends across the direction in which the sheet is advanced through the machine so that one roller of said pair of rollers of said upper or lower corrugating means is adjustable along the axis relative to the other roller of said pair of rollers of said upper or lower corrugating means.

4,986,106

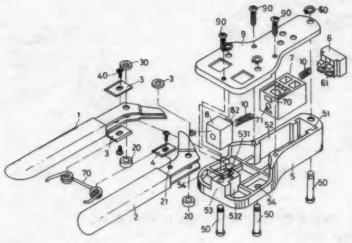
MULTIPURPOSE CRIMPER FOR CABLE CONNECTION

Liaw Gwo-Jiang, No. 1, Alley 78, Lane 113, Sec. 2, Chung Shan Rd, Shu Lin Tsen, Taipei, Taiwan

Filed Sep. 29, 1989, Ser. No. 414,544

Int. Cl.[5] H01R *43/042*

U.S. Cl. 72—410 **3 Claims**



1. A multipurpose crimper having a pair of handle portions including a left-handed handle portion and a right-handed handle portion, a pair of cable stripper blades including a first cable stripper blade and a second cable stripper blade, a shearing cutter, a bottom block, a fixed crimper having dowels, a movable die, and movable crimper having dowels, a cover plate, and a pair of springs,

wherein said bottom block comprises a trough at the rear end receiving said fixed crimper, another trough in the middle receiving said movable die and said movable crimper so that said fixed crimper, movable die and movable crimper are all arranged in tandem, a base mounted thereon said first cable stripper blade, two holes onto which a cushion, a pair of washers and said two opposite handle portions are respectively pivotally mounted, said handles each having ends for engaging said movable crimper in a cam-follower arrangement; said pair of springs being respectively set between said movable die and said fixed and movable crimpers; said cover plate covering said bottom block to firmly retain said two handle portions therebetween; said second cable stripper blade being mounted on said left handle portion; said shearing cutter being fixedly connected to said right-handed handle portion at the bottom;

characterized in that when said two opposite handle portions are squeezed inward, said first cable stripper blade is driven toward said second cable stripper blade for cable stripping; said shearing cutter on said right-handed handle portion moves toward said base to cut a cable; and said movable crimper and said movable die are pushed toward said fixed crimper by the ends of said handle retained between said cover and block so that the dowels of said movable and fixed crimpers respectively are inserted into said movable die to perform crimping process.

4,986,107

RACK FOR ASSEMBLING, INSPECTING AND REPAIRING VEHICLE BODIES

Lucien Peyret, No. 5, 1ere Rue, Le Corbusier Les bruneaux 42700 Firminy, France

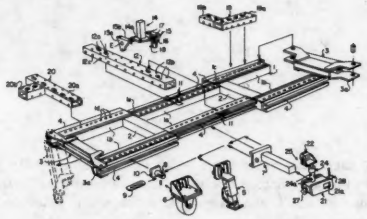
PCT No. PCT/FR88/00492, § 371 Date Jul. 13, 1989, § 102(e) Date Jul. 13, 1989, PCT Pub. No. WO89/03504, PCT Pub. Date Apr. 20, 1989

PCT Filed Oct. 5, 1988, Ser. No. 364,434

Claims priority, application France, Oct. 6, 1987, 87 14149

Int. Cl.[5] B21D *1/12*

U.S. Cl. 72—457 14 Claims



1. A rack for the assembly, inspection and repair of vehicle bodies, comprising:

a pair of essentially parallel side members, each of said side members forming a central part which is intermediate and offset inwardly from a pair of end parts;

a pair of cross members connecting the pair of side members, said cross members attached perpendicularly between the end parts to form a pair of U-shaped openings when seen in plan view, the U-shaped openings connected and braced at the cross members by the central part; and,

a pair of transverse ends removably attached between the said end parts at the ends thereof and capable of angular pivoting in relation to one or the other of the end parts to provide free access to the corresponding U-shaped opening.

4,986,108

AUTOMATIC MATERIAL ASSAY

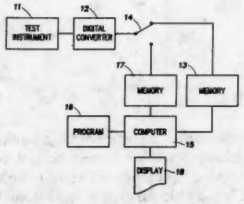
Geoffrey Wilde, Bolton, England, assignor to Cargill UL Limited, London, England

Filed Mar. 31, 1989, Ser. No. 331,909

Claims priority, application United Kingdom, Apr. 28, 1988, 8810074

Int. Cl.[5] G01C *25/00*

U.S. Cl. 73—1 R 9 Claims



1. A method of carrying out automatic assay of the material properties of a substance, said material properties being variable, using equipment that needs to be calibrated against a sacrificial standard which is itself subject to variation from sample to sample, comprising using in the calibration a cumulative average standard sample value derived from a cumulative plurality of calibrations.

4,986,109

ABRASION-PROOF TESTER

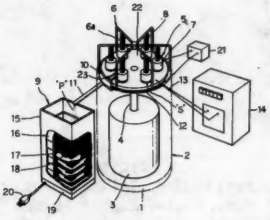
Bum K. Moon, Seoul, Rep. of Korea, assignor to Goldstar Co., Ltd., Seoul, Rep. of Korea

Filed Nov. 22, 1989, Ser. No. 440,262

Claims priority, application Rep. of Korea, Nov. 25, 1988, 15577

Int. Cl.[5] G01N *3/56*

U.S. Cl. 73—7 4 Claims



1. An abrasion-proof tester capable of analyzing the granularity of abraded powder, which comprises:

a table;

a cylinder disposed on said table;

a variable speed motor mounted within said cylinder;

an abrasive plate fixed to a driving shaft of said variable speed motor;

a plurality of supporting bars fixed to the top of said cylinder and provided with perpendicular supporting bars at the middle thereof;

test piece supporting means for closely contacting test pieces to said abrasive plate and being elastically supported to said perpendicular supporting bars by compression of a coil spring, respectively;

a granularity measuring device disposed at a side of said cylinder for measuring the granularity of abraded powder and separating the abraded powder, said granularity measuring device including several sieves disposed within a housing thereof and a number of meshes which are sequentially increased from the top sieve to the bottom sieve;

abraded powder collecting curve corner disposed at a side of periphery of said abrasive plate;

a discharging tube communicated with said abraded powder collecting curve corner for discharging the abraded powder of test pieces into said granularity measuring device; and

a heater for heating said abrasive plate is mounted on the top surface of said cylinder.

4,986,110

METHOD AND APPARATUS FOR TAKING SAMPLES OF AND FOR ANALYZING HYDROCARBONS

Guenter Voss, Much, Fed. Rep. of Germany, assignor to Leybold Aktiengesellschaft, Fed. Rep. of Germany

Filed Sep. 29, 1989, Ser. No. 414,538

Claims priority, application European Pat. Off., Sep. 29, 1988, 88116048

Int. Cl.[5] G01N *30/12*

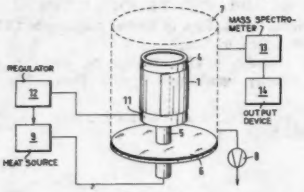
U.S. Cl. 73—23.38 16 Claims

1. A method for taking samples of and for analyzing fluid hydrocarbons, comprising the steps of:

collecting a hydrocarbon sample by sorption in a solid sor-

bent having a high solubility and having a low diffusion quotient with respect to the hydrocarbon sample;

transporting the sample to analysis equipment; and



analyzing the sample by heating the sorbent in a vacuum during the analysis and subjecting the sample to mass spectrometry.

4,986,111

NON-CONTACTING GAUGE FOR SURFACES

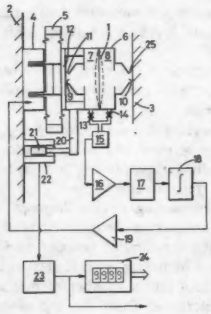
Roger C. H. Sidey, London, England, assignor to The British Petroleum Company p.l.c., London, England

Filed Aug. 10, 1989, Ser. No. 392,237

Claims priority, application United Kingdom, Aug. 17, 1988, 8819575

Int. Cl.[5] G01B *13/12*

U.S. Cl. 73—37.5 **8 Claims**



1. A non-contacting gauge for measuring small variations in the surfaces of objects comprising

(a) a chamber separated into two sub-chambers by a vibrating diaphragm,

(b) a nozzle for each sub-chamber,

(c) a reference surface adjacent to one of the nozzles, and,

(d) a frame holding the chamber and reference surface moveable relative to the surface to be gauged and adapted to bring the other nozzle into the vicinity of the surface.

4,986,112

COMPOSITE PRESSURE VESSEL FOR A NUCLEAR ENVIRONMENT

James R. Hopkins, Oakville, and Brian Strachan, Mississauga, both of Canada, assignors to Atomic Energy of Canada Ltd., Mississauga, Canada

Filed Sep. 20, 1989, Ser. No. 409,781

Claims priority, application Canada, Nov. 2, 1988, 581982

Int. Cl.[5] G01M *3/32*

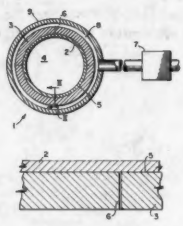
U.S. Cl. 73—49.2 **6 Claims**

1. A pressure vessel for fluids containing hydrogen and subjected to a neutron flux, comprising;

an inner sealing layer substantially impervious to hydrogen;

an outer load bearing layer;

said inner layer being composed of a material having a radiation induced diametral deformation rate higher than that of the outer layer, to minimize stresses in the inner layer in operation;



said inner and outer layer being non-metallurgically joined to one another to define an interface permeable to fluid and inhibit crack propagation from the inner to outer layer;

said outer load bearing layer having a plurality of spaced apertures to allow passage of any fluid penetrating the sealing layer.

4,986,113

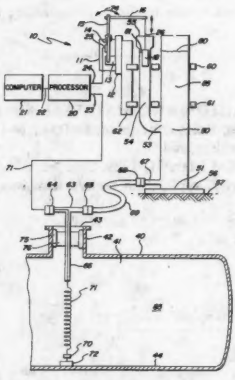
LIQUID TANK LEAKAGE DETECTION SYSTEM

John M. Harrison; Hubert L. Marshburn, both of Fountain Valley, Calif., and Ron Stout, deceased, late of Bedford, Ind. by Sondra J. Stout, Administrator , assignors to Computerized Tank Testing, Inc., Fountain Valley, Calif.

Filed Sep. 18, 1989, Ser. No. 408,736

Int. Cl.[5] G01M *3/32; G01F 23/32*

U.S. Cl. 73—49.2 **13 Claims**



1. For use in detecting leakage within a liquid tank having a filler pipe, a leakage detection system comprising:

a standpipe having an elongated body defining a first open end and a second closed end, a first internal passage and a spout extending therefrom;

coupling means for sealingly coupling said first internal passage to the filler pipe of the tank such that a quantity of liquid may be introduced into said standpipe filling the filler pipe, said coupling means and a portion of said standpipe to establish a liquid level therein;

a float configured to float upon the liquid;

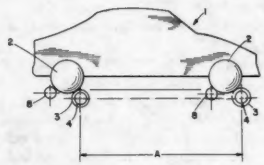
a sensing beam having a fixed end and a free end;
beam support means coupled to said fixed end of said sensing beam holding it stationary;
temperature means for measuring the temperature of the liquid within the tank.
strain measuring means operatively coupled to said sensing beam responsive to strain or bending thereof; and
float coupling means coupling said float to said free end of said sensing beam such that movement of said float causes strain or bending of said sensing beam said float coupling means including a rigid arm having a first end fixed to said free end of said sensing beam and a second end and a float line coupling said float to said second end of said arm.

4,986,114

TEST APPARATUS FOR MOTOR VEHICLES, ESPECIALLY BRAKE TEST STAND FOR VEHICLES WITH ANTISKID BRAKE SYSTEMS

Werner Rothmann, Essen, and Hans J. Meckelburg, Wuppertal, both of Fed. Rep. of Germany, assignors to Rheinisch-Westfälischer Technischer Überwachungs-Verein e.V.

Filed Sep. 25, 1989, Ser. No. 412,131
Claims priority, application Fed. Rep. of Germany, Sep. 29, 1988, 3833021; Jul. 8, 1989, 3922570
Int. Cl.[5] G01M *19/00*
U.S. Cl. 73—117 **14 Claims**



1. Test apparatus for motor vehicles comprising a stand having drive rollers and backup rollers for contacting the vehicle wheels to be tested, flywheel masses associated with rotating parts of the test apparatus, an adjustable slippage member associated with each of the drive rollers for brake-torque- dependent changing of the drive torque between the vehicle wheels and the drive rollers while maintaining adherence conditions between the vehicle wheels and drive rollers, means for coupling the drive rollers with each other and for driving same during a simulated brake process by the said flywheel masses, said slippage members each being an electrical or hydraulic machine controllable independently of each other.

4,986,115

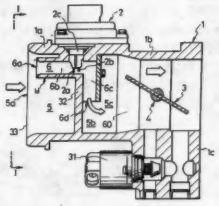
HOT-WIRE AIR FLOW METER

Yoshihito Sekine, Ibaraki; Nobukatsu Arai, Ushiku; Tadao Osawa, Katsuta; Hiroatsu Tokuda, Katsuta; Toshifumi Usui, Katsuta, and Mitsukuni Tsutsui, Ibaraki, all of Japan, assignors to Hitachi, Ltd., Tokyo, Japan

PCT No. PCT/JP88/00577, § 371 Date Feb. 16, 1989, § 102(e) Date Feb. 16, 1989, PCT Pub. No. WO88/10411, PCT Pub. Date Dec. 29, 1988
PCT Filed Jun. 15, 1988, Ser. No. 313,962
Claims priority, application Japan, Jun. 17, 1987, 62-148993
Int. Cl.[5] G01M *15/00*
U.S. Cl. 73—118.2 **17 Claims**

1. A hot-wire air flow meter for an internal combustion engine, comprising:
a main passage forming part of an air intake flow passage of the internal combustion engine;
a hot wire element for measuring a quantity of air drawn in the main passage; and
a bypass passage disposed in said main passage and containing said hot wire element;
wherein said main passage includes a throttled portion formed between the bypass passage and a position in said main passage where a throttle valve is to be located downstream of the bypass passage;
wherein said bypass passage has an L-shaped configuration including a first flow path portion formed in an axial direction of said main passage, and a second flow path portion formed in a radially inward direction of said main passage and extending across a center axis of said main passage; and
wherein said throttled portion is located in said main passage in a region which is downstream of a point spaced from the outlet of said bypass passage by a distance approximately equal to the width of an outlet opening of said second flow path portion.

11. A hot-wire air flow meter for an internal combustion engine, comprising:



a main passage forming part of an air intake flow passage of the internal combustion engine;
a hot wire element for measuring a quantity of air drawn in the main passage; and
a bypass passage containing the hot wire element;
wherein said main passage includes a throttled portion formed between the bypass passage and a position in said main passage where a throttle valve is to be located downstream of the bypass passage; and
wherein said bypass passage has an L-shaped configuration including a first flow path portion formed in an axial direction of said main passage, and a second flow path portion extending in a radially inward direction within said main passage and having an outlet portion forming an outlet opening of said bypass passage, said outlet portion including at the upper stream portion thereof a projection which projects beyond the lower stream portion of the outlet portion so as to shield said outlet opening from air flow in said main passage.

4,986,116

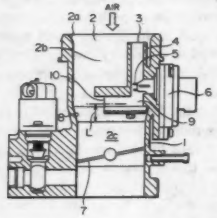
AIR FLOW METER FOR INTERNAL COMBUSTION ENGINE

Toshifumi Usui, Katsuta, and Atsushi Hohkita, Hitachi, both of Japan, assignors to Hitachi, Ltd., Tokyo and Hitachi Automotive Engineering Co., Ltd., Ibaraki, both of, Japan

Filed Oct. 10, 1989, Ser. No. 419,338
Claims priority, application Japan, Oct. 18, 1988, 63-260469
Int. Cl.[5] G01M *19/00*
U.S. Cl. 73—118.2 **15 Claims**

1. An air flow meter for an internal combustion engine comprising an intake air passage of an internal combustion engine, said intake air passage being composed of a primary flow passage and an auxiliary flow passage having a specified length and having a portion which projects within said primary flow passage and is disposed substantially in parallel to the direction of an air flow passing through said primary flow passage, and a sensor for measurement of an intake air flow rate, said sensor being disposed within said auxiliary flow passage, said intake air passage further having a cross-sectional

area change portion provided at a wall surface of said primary flow passage, said primary flow passage being changed in cross-sectional area at said cross-sectional area change portion, an outlet of said auxiliary flow passage being located in an area where the lines of an air flow in the primary flow passage are



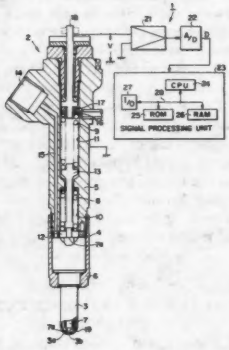
compressed by said portion of change in cross-sectional area, and wherein the auxiliary flow passage is disposed away from the center axis of said primary flow passage and in close proximity to a wall surface of said primary flow passage, and said outlet of the auxiliary flow passage is directed away from said wall surface of said primary flow passage.

4,986,117

METHOD FOR DETECTING FUEL INJECTION PERFORMANCE OF FUEL INJECTION VALVE

Fumitsugu Yoshizu, and Kazuhiko Sato, both of Higashimatsuyama, Japan, assignors to Diesel Kiki Co., Ltd., Tokyo, Japan

Filed Mar. 23, 1990, Ser. No. 497,613
Claims priority, application Japan, Mar. 27, 1989, 1-71802
Int. Cl.[5] G01M *19/00*
U.S. Cl. 73—119 A **10 Claims**



1. A method for detecting the fuel injection performance of a fuel injection valve in which a nozzle needle is biased toward an associated valve seat by a spring member in such a way that the nozzle needle is lifted off from the valve seat to inject fuel when pressurized fuel is supplied thereto, said method comprising steps of:

detecting at one end of the spring member time-course change in magnitude of a shock wave produced in the spring member when fuel is injected from the fuel injection valve; and

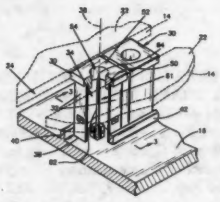
determining time-course change in the pressure of injected fuel acting on the nozzle needle during the fuel injecting operation of the fuel injection valve on the basis of the time-course change in magnitude of the shock wave returning from the nozzle needle side end in the spring member by reflection.

4,986,118

APPARATUS FOR MEASURING TIRE TREAD FORCE AND MOTION

Marion G. Pottinger, Akron, Ohio, assignor to The Uniroyal Goodrich Tire Company, Akron, Ohio

Filed Mar. 2, 1990, Ser. No. 487,575
Int. Cl.[5] G01M *17/02*
U.S. Cl. 73—146 **41 Claims**



14. An apparatus for measuring tire force and tire tread motion in a plurality of common areas of a tire under test, said apparatus comprising:

tire test block having a bearing surface over which a tire to be tested is rolled;

a plurality of force sensing means, each force sensing means received in an associated opening in said block and adapted to be engagable by the tire under test, each said force sensing means including a longitudinally extending member and a longitudinally extending opening in said member, said member having a central axis, said central axis being oriented substantially perpendicular to said bearing surface of said test block, each said force sensing means further including associated force measuring means secured to its associated member and having an electrical characteristic indicative of force applied to its associated member by the tire under test; and

a plurality of motion sensing means, each force sensing means having an associated motion sensing means located within its said longitudinally extending opening of its member, each said motion sensing means including an elongated pin having a tip extending beyond said bearing surface of said test block so that said tip penetrates the tread of the tire under test as the tire rolls over its associated motion sensing means, each said motion sensing means further including motion measuring means secured to its associated pin and having an electrical characteristic indicative of the motion of its associated pin which is, in turn, indicative of the motion of the tread of the tire penetrated by its associated pin.

4,986,119

VEHICLE DIAGNOSTIC DEVICE

Gerald P. Glcewicz, 2049 Collett La., Flossmoor, Ill. 60422

Continuation-in-part of Ser. No. 191,269, May 6, 1988, Pat. No. 4,912,970. This application Dec. 4, 1989, Ser. No. 444,887
Int. Cl.[5] G01M *17/02*
U.S. Cl. 73—146 **39 Claims**

1. A vehicle diagnostic device to support at least one tire comprising, in combination,

a support having a horizontal upper surface,

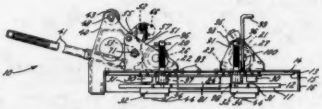
at least one platform,

means for glideably coupling each platform to the upper surface of the support whereby the platform is permitted to glide horizontally in any direction,

at least one pair of tire support rollers associated with each platform having substantially horizontal parallel axes, said

support rollers being rotatably supported on the platform for rotation about said axes such that the support rollers provide rolling surfaces which contact the tread of a tire and allow the tire to cycle when supported on the support rollers,

at least one pair of front retention rollers associated with a pair of support rollers, said front retention rollers disposed



to restrict movement of the tire laterally relative to the support rollers, and

at least one pair of rear retention rollers associated with a pair of support rollers, said rear retention rollers disposed to restrict movement of the tire laterally relative to the support rollers,

whereby, as a tire is cycled, the platform adjusts relative to the tire and the support to assume a dynamic equilibrium.

4,986,120

LOW-WATER-PRESSURE CONTROLLED HYDROLOGIC TEST METHOD

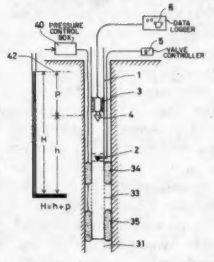
Koichi Yanagisawa, Toki, and Yoichi Hirata, Tokyo, both of Japan, assignors to Doryokuro Kakunenryo Kaihatsu Jigyodan and Taisei Kiso Sekkei Co., Ltd., both of Tokyo, Japan

Filed Jun. 6, 1989, Ser. No. 361,883

Claims priority, application Japan, Jun. 9, 1988, 63-142399

Int. Cl.[5] E21B *47/06*

U.S. Cl. 73—155 **6 Claims**



1. A low-water-pressure-controlled hydrologic test method for a single-hole type permeability test using a double packer system in which packers are arranged above and below a strainer, comprising the steps of providing in a measurement pipe a valve which can be opened and closed and an inner packer which is equipped with a water pressure gage at its tip, and establishing an appropriate water level in advance in the measurement pipe so as to diminish the difference in head pressure between the water level in the measurement pipe and the pore water level of the rock concerned.

4,986,121

APPARATUS FOR MEASURING THE VERTICAL MOTION OF A FLOATING PLATFORM

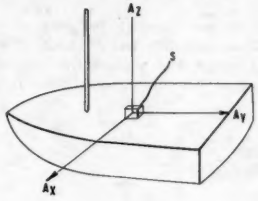
John Luscombe, Oxford, England, assignor to Technical Survey Services Ltd., Bicester, England

Filed Sep. 12, 1989, Ser. No. 406,312

Int. Cl.[5] G01C *21/16*; G01P *15/00*

U.S. Cl. 73—170 A **13 Claims**

1. An apparatus for measuring the vertical displacement of a floating platform caused by wave action and which comprises a sensor having three accelerometers arranged on mutually perpendicular axes so that one accelerometer acts in a substantially vertical plane and the other two accelerometers act in substantially horizontal plane, output signal means producing output signals from the three accelerometers, a reference signal



transmitter which produces a reference signal, sampling means to continually sample and the accelerometer output signals and the reference signal, and a data processor unit to process the sampled output signals and reference signal to provide a signal indicative of the vertical position of the platform.

4,986,122

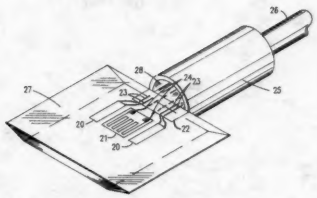
FLUID VELOCITY MEASUREMENT INSTRUMENT

Giselher R. Gust, St. Petersburg, Fla., assignor to Hydro Data Inc., St. Petersburg, Fla.

Filed Nov. 8, 1989, Ser. No. 434,867

Int. Cl.[5] G01F *1/68, 25/00*

U.S. Cl. 73—204.15 **20 Claims**



11. A gauge for time-resolved measurements of magnitude and vector of velocity in laminar and turbulent fluid flows, said gauge comprising

a composite gauge having a skin friction sensor element on a smooth surface of an electrically insulated flat plate of low thermal conductivity with bevelled edge, and an assortment of thermal indicators around it being within the thermal field of influence located downstream of the thermal wake of the heated skin friction element, said elements being flush with said surface,

said probe connected to a bridge circuit having means connected thereto to maintain the temperature or current of the skin friction element,

said probe connected additionally to electronics having means connected thereto to convert temperature changes of thermal indicators adjacent to the skin friction element into voltage signals and to monitor these signals,

said gauge mounted in a calibration device having known flow, temperature, fluid characteristics, and controlled values of velocity,

said voltage outputs related to known values of velocity, direction, and fluid composition in said calibration facility, and obtaining calibration curves which relate magnitude of the flow of selected fluids to the voltage output of the anemometer, direction of the flow of selected fluids to the voltage output of the thermal indicator electronics, and

volume fractions of heterogeneous fluid mixtures to the voltage output of the anemometer (where applicable),

removing said gauge from said calibration facility,

mounting said gauge in a fluid flow to be tested with the leading edge facing the flow, either at a fixed location or moving relative to the fluid flow in a known path and time pattern,

providing fluid flow relative to the gauge,

measuring flow magnitude and direction of flow with said calibrated gauge, and volume fractions of co-existing constituents of heterogeneous mixtures (where applicable).

4,986,123

HOLDER FOR THIN ELECTRICAL RESISTANCE SENSORS OF AN AIR FLOW MEASURING DEVICE

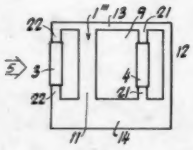
Karl-Heinrich Lösing, Wesel, and Walter Schauer, Neuss, both of Fed. Rep. of Germany, assignors to Pierburg GmbH, Neuss, Fed. Rep. of Germany

Filed Aug. 3, 1989, Ser. No. 389,368

Claims priority, application Fed. Rep. of Germany, Aug. 4, 1988, 3826483; May 16, 1989, 3915872

Int. Cl.[5] G01F *1/68*

U.S. Cl. 73—204.26 10 Claims



1. A holder device for apparatus for measuring air flow in the intake manifold of an internal combustion engine, the apparatus comprising an air flow sensor and a temperature sensor, each sensor comprising a flat carrier of electronically insulative material and electrical circuit means on said carrier, said holder device comprising a flat holder member constructed separately from said sensors and means for fixedly securing said air flow sensor and said temperature sensor on said holder member one after the other in a common plane parallel to the direction of air flow with the sensors disposed in said common plane, said holder member comprising a closed frame which can be disposed in the air flow and which includes upper and lower legs and front and rear spaced legs defining an interior opening bounded by said upper, lower, front and rear legs, means extending from said upper and lower legs in front of said front leg for engaging the carrier of one of said sensors to secure said one sensor to said frame in front of said front leg, and means projecting into said interior opening between said front and rear legs for engaging the carrier of the other of said sensors to secure said other sensor to said frame between said front and rear legs, said front leg being disposed between said sensors and having a thickness greater than that of said sensors, said common plane which contains said sensors being disposed within the thickness of said front leg.

4,986,124

SCREENED INDUCTANCE SENSORS, ESPECIALLY SENSORS FOR LEVEL MEASUREMENT

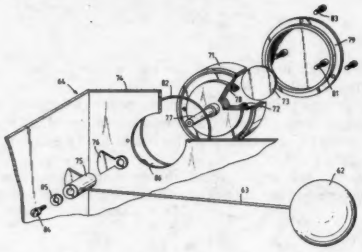
John V. Byrne, Dublin; Francis McMullin, Clare, and Aengus Murray, Dublin, all of Northern Ireland, assignors to Kollmorgen Corporation, Simsbury, Conn.

Filed Jun. 15, 1988, Ser. No. 207,384

Claims priority, application Ireland, Jun. 15, 1987, 1575/87; Jun. 15, 1987, 1576/87

Int. Cl.[5] G01F *23/32, 23/38*

U.S. Cl. 73—317 1 Claim



1. A sensor comprising a drive or exciting winding for establishing a forward or drive field, at least one secondary or sense winding in which a voltage may be induced in the presence of said forward or drive field, and at least one conductive screen within which eddy currents are generated in the presence of said forward or drive field to establish a counter-field opposing said forward or drive field, said at least one conductive screen and said at least one secondary or sense winding being displaceable relative to one another within said forward or drive field so that said at least one secondary or sense winding may be shaded by said at least one conductive screen to a varying extent to thereby vary the voltage induced in said at least one secondary or sense winding, and barrier means being interposed between the windings of the sensor and said at least one conductive screen so that said at least one conductive screen may be disposed within a region environmentally isolatable from the region in which said drive or exciting winding and said at least one secondary or sense winding are located, wherein said barrier means comprises a stator portion on which said drive or exciting winding and said at least one secondary or sense winding are disposed, said stator portion has means for guiding displacement of said at least one conductive screen for said shading of said at least one secondary or sense winding, and said means for guiding displacement of said at least one conductive screen is an axle or pin, and the sensor includes a screen assembly rotatingly mounted on said axle or pin.

4,986,125

ULTRASONIC MICROSCOPE

Yasuhiro Omura; Mitsugu Sakai, both of Hachioji; Koichi Karaki, Hino, and Yasuo Sasaki, Hachioji, all of Japan, assignors to Olympus Optical Co., Ltd., Tokyo, Japan

Filed Jan. 2, 1990, Ser. No. 460,274

Claims priority, application Japan, Jan. 19, 1989, 1-3877[U]

Int. Cl.[5] G01N *29/00*

U.S. Cl. 73—606 11 Claims

1. A supersonic microscope, comprising:

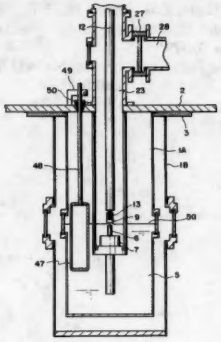
a container for containing a coupler liquid;

an acoustic lens housed in the container to emit a supersonic beam;

means for holding a sample in the container so that a face of the sample to be viewed faces the acoustic lens;

driver means for relatively moving the acoustic lens and the

sample in directions X and Y to scan the sample with the supersonic beam; and



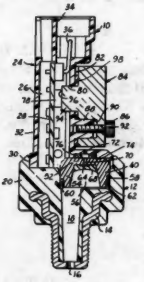
contact means for contacting the viewed face of the sample with the surface of the coupler liquid when sample observation is to be carried out.

4,986,126

TRANSDUCER WITH HEAT SINK

Daniel F. Lawless, Hazel Green, Ala., assignor to Acustar, Inc., Troy, Mich.

Filed Mar. 26, 1990, Ser. No. 498,526
Int. Cl.[5] G01L *19/04*
U.S. Cl. 73—708 **8 Claims**



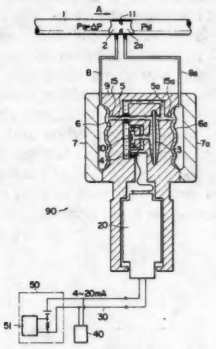
5. An improved electronic transducer for sensing fluid pressure and having at least one electronic power device and a heat sink therefore for generating a relatively large electrical output from a smaller electrical signal generated from a fluid pressure, comprising: a chip means for sensing fluid pressure and generating a relatively small electrical signal corresponding to the pressure level; enclosure means including a support for the chip means and define an interior space communicated with one side of the chip means; a circuit board in the enclosure space; at least one electronic power device on the circuit board for enhancing the small electrical signal and producing heat; the enclosure means defining a thin wall generally extending in close parallelism with the circuit board and further defining a windowed aperture in the wall which is aligned with the power device; a heat sink device extending over the thin wall and having a projecting portion extending through the windowed aperture and into engagement with the power device whereby heat is transferred to the heat sink and to atmosphere.

4,986,127

MULTI-FUNCTIONAL SENSOR

Satoshi Shimada; Seiichi Ugai, both of Hitachi; Akira Sase, and Yasushi Shimizu, both of Katsuta, all of Japan, assignors to Hitachi, Ltd., Tokyo, Japan

Filed Apr. 5, 1989, Ser. No. 333,246
Claims priority, application Japan, Apr. 6, 1988, 63-82961
Int. Cl.[5] G01L *7/08, 9/06, 13/06*
U.S. Cl. 73—714 **5 Claims**



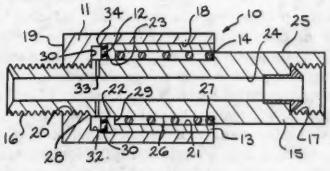
1. Multi-functional sensor comprising:
a support base made from borosilicate;
a diaphragm with a E-shaped section secured to the base, the diaphragm being made from single crystalline silicon, principal plane thereof being oriented to be a crystalline plane (110);
a differential pressure sensor having p-doped piezoresistor elements formed in the principal plane of the diaphragm at a thin wall portion of the E-shaped sectional diaphragm, each element being arranged along a crystal axis <111>;
a static pressure sensor having p-doped piezo-resistor elements formed in the principal plane at an outer peripheral thick wall portion of the E-shaped sectional diaphragm, each element being arranged along the crystal axis <111>; and
a temperature sensor having a p-doped piezo-resistor element formed in the principal plane at the outer peripheral thick wall portion of the E-shaped sectional diaphragm, the element being arranged along a crystal axis <100>.

4,986,128

IN-LINE PRESSURE GAUGE

Marvin D. Burns, Milbury, Ohio, assignor to The DeVilbiss Company, Toledo, Ohio

Filed Dec. 22, 1989, Ser. No. 455,621
Int. Cl.[5] G01L *7/16*
U.S. Cl. 73—744 **5 Claims**



1. An improved pressure gauge for measuring gas pressure in a line having an end comprising, in combination, a tubular adapter having first and second ends, said adapter having a first

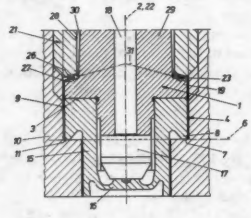
diameter at said first end, an intermediate diameter portion between said first and second ends and a larger diameter at said second end with a first step formed between said first end and said intermediate diameter portion and a second step formed between said intermediate diameter portion and said second end, wherein said first end is externally threaded, means for attaching one of said adapter ends to said line end, said adapter having an axial opening maintaining gas flow through said line and said adapter, means for defining a closed annular gas chamber extending coaxially about said adapter, a tubular sleeve having a stepped opening with an internally threaded first end threaded onto said first adapter end to abut said first step, said sleeve defining a portion of said chamber, passage means connecting said chamber with said axial opening for allowing gas to flow therebetween, a tubular plunger extending coaxially about said adapter, means for moving said plunger in an axial direction on said adapter in proportion to the gas pressure in said chamber, said plunger moving between a first position at a minimum gas pressure and a second position at a maximum gas pressure, and means responsive to axial movement of said plunger for indicating such gas pressure.

4,986,129

PRESSURE SENSOR

Friedrich Ruckenbauer, Graz, and Josef Winkler, Judendorf-Strassengel, both of Austria, assignors to AVL Gesellschaft für Verbrennungskraftmaschinen und Messtechnik m.b.H. Prof.Dr.Dr.H.c. Hans List, Graz, Austria

Filed Mar. 30, 1990, Ser. No. 501,884
Int. Cl.[5] G01L *7/08, 9/00*
U.S. Cl. 73—756 **12 Claims**



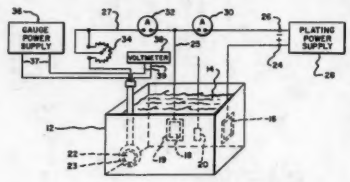
1. A pressure sensor comprising a supporting part insertable in a measuring bore having an internal thread, and an integrated sensor part holding a sensor element, which is in at least indirect contact with a membrane subject to the pressure to be determined, said sensor part being provided with a sealing area for sealing said pressure sensor against said measuring bore, wherein corresponding surfaces of a shoulder of said supporting part and of a fastening element which can be screwed into said measuring bore are configured as lateral surfaces of a cone whose generating lines intersect with the longitudinal axis of said supporting part, said corresponding surfaces transmitting the pressure from said fastening element onto said supporting part, permitting a slight tilt of the longitudinal axis of said supporting part relative to the axis of said internal thread of said measuring bore.

4,986,130

APPARATUS AND METHOD FOR MONITORING STRESS AS A COATING IS APPLIED

Darell E. Engelhaupt, 702 Tatom St. NW., Huntsville, Ala. 35805, and Kurt H. Iriesberger, 337 Wekiva Springs Rd., Longwood, Fla. 32779

Filed Oct. 19, 1989, Ser. No. 422,887
Int. Cl.[5] G01B *5/30*
U.S. Cl. 73—760 **20 Claims**



1. Apparatus for monitoring stress in a coating of material comprising:

a. a housing having a chamber means;

b. a deformable diaphragm means forming one wall of said chamber means and having an outer surface for receiving the coating of material and having an inner surface;

c. a generally incompressible fluid filling said chamber means and in contact with said deformable diaphragm means inner surface to have a pressure due to pressing of said diaphragm means against said fluid which is indicative of stress in the coating; and

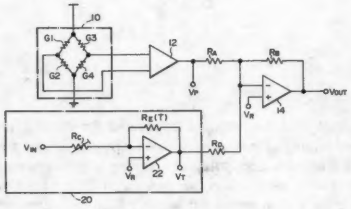
d. a pressure transducer means in communication with said fluid for sensing the fluid pressure and converting the fluid pressure to electrical signals whereby the electrical signals are indicative of the stress in the coating of material.

4,986,131

SEMICONDUCTOR STRAIN DETECTOR

Susumu Sugiyama, Nagoya; Shiro Yamashita, and Hirofumi Funabashi, both of Aichi, all of Japan, assignors to Kabushiki Kaisha Toyota Chuo Kenkyusho, Aichi, Japan

Filed Dec. 28, 1989, Ser. No. 458,538
Claims priority, application Japan, Dec. 28, 1988, 63-333863
Int. Cl.[5] G01L *1/00*
U.S. Cl. 73—766 **22 Claims**



1. A semiconductor strain detector comprising:

(a) a semiconductor substrate having a strain sensitive region;

(b) a bridge circuit including strain gauges each disposed at least in part at said strain sensitive region, each said strain gauge having a resistance varying in response to the strain of said strain sensitive region;

(c) a zero-point temperature compensating circuit for outputting a signal having a predetermined temperature characteristic; and

(d) an operational amplifier circuit for summing the output

of said bridge circuit and the output of said zero-point temperature compensating circuit;

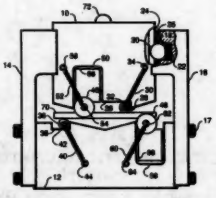
(e) said zero-point temperature compensating circuit including (i) a thermosensitive resistor having a resistance varying depending on the temperature, and (ii) constant current means for supplying to said thermosensitive resistor a constant current of a predetermined direction and a predetermined amount, whereby a zero-point temperature characteristic of said bridge circuit is cancelled by the temperature characteristic of the output of said zero-point temperature compensating circuit.

4,986,132

FULLY ARTICULATED FOUR-POINT-BEND LOADING FIXTURE

Anthony M. Calomino, Cleveland, Ohio, assignor to The United States of America as represented by the Administrator of the National Aeronautics and Space Administration, Washington, D.C.

Filed Dec. 28, 1989, Ser. No. 458,274
Int. Cl.[5] G01N *3/20*
U.S. Cl. 73—852 **11 Claims**



1. A self-aligning, fully articulated four-point-bend loading fixture for modulus of rupture and fracture toughness testing of a brittle material specimen which is warped, twisted, or non-parallel comprising

an inner fixed span provided by a first loading plate having a groove on each end thereof,

a second loading plate spaced from said first loading plate for providing an outer span,

pair of arms secured to opposite ends of said second loading plate facing the oppositely disposed grooves in said first loading plate,

means on each of said arms for resiliently mounting a ball bearing for engaging said first loading plate in said grooves thereby centering said inner fixed span about said outer span while accommodating rotation of said upper loading plate with respect to said lower loading plate,

a pair of first rollers mounted for rotation about spaced first axles carried by said first loading plate, the spacing between said first axles establishing said inner fixed span, and

a pair of second rollers mounted for rotation about spaced second axles carried by said second loading plate, the spacing between said second axles establishing said outer span, said first and second pairs of rollers engaging said specimen for applying the load thereto.

4,986,133

FLOW METER

Jack E. Lake, Racine, Wis., assignor to Lake Monitors, Inc., Racine, Wis.

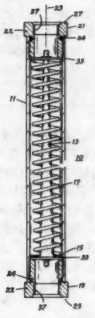
Filed Mar. 1, 1990, Ser. No. 486,807
Int. Cl.[5] G01F *1/22*
U.S. Cl. 73—861.58 **14 Claims**

1. An improved flow meter for indicating the rate of flow of a fluid flowing therethrough including:

-a generally cylindrical first tube having a longitudinal axis and first and second ends;

-a rod assembly including a plurality of aperture plates and a rod having first and second ends, the rod being supported at each of its ends by an aperture plate and in a position to be generally concentric with the tube, each aperture plate being attached to an end of the rod, the rod having a metering section which is tapered at a generally uniform rate over at least a portion of its length;

-a generally planar, sharp-edged first orifice disk having a circular metering aperture positioned generally concentric with the metering section and coacting therewith for providing an indication of the rate of flow of a fluid through the meter;



-a spring confined within the tube for urging the disk toward the first end of the tube;

-a porting assembly received within each end of the tube and arranged to provide fluid-tight sealing engagement between the porting assembly and the tube;

-each porting assembly being removably received within each end of the tube and each aperture plate being attached to an end of the rod by a removable, friction fastener;

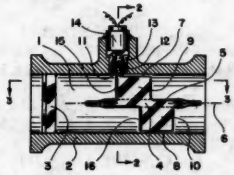
the flow meter thereby being adapted for easy disassembly and substitutive replacement of the orifice disk.

4,986,134

VORTEX FLOWMETER WITH INERTIALLY BALANCED VORTEX SENSOR

Hyok S. Lew, 7890 Oak St., Arvada, Colo. 80005

Filed Sep. 26, 1989, Ser. No. 412,793
Int. Cl.[5] G01F *1/32*
U.S. Cl. 73—861.24 **20 Claims**



1. An apparatus for measuring flow rate of fluid comprising in combination:

a) a body including a flow passage extending therethrough;

b) a vortex generating bluff body of an elongated cylindrical shape disposed across a first cross section of the flow passage;

c) a vortex sensing planar member disposed across a second cross section of the flow passage generally parallel to the vortex generating bluff body on a plane generally parallel

to the central axis of the flow passage in a pivotable arrangement about a pivot axis generally parallel to the central axis of the flow passage and disposed at a midsection of the vortex sensing planar member, said pivotable arrangement allowing a pivoting movement of the vortex sensing planar member about said pivot axis over at least a minute angle, wherein leading edges of two halves of the vortex sensing planar member respectively located on two opposite sides of said pivot axis are off-set from one another by a distance generally equal to noninteger times the wave length of sinuating streamlines created by vortices shed from the vortex generating bluff body; and

d) at least one transducer means connected to a deflective portion of the vortex sensing planar member for converting an alternating torque about said pivot axis generated by vortices shed from the vortex generating bluff body and experienced by the vortex sensing planar member to an alternating electromotive force.

4,986,135

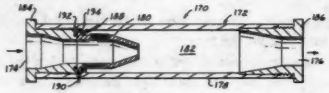
APPARATUS AND METHOD FOR MEASURING FLUID FLOW AND DENSITY

George A. Corser, Flint; Gary C. Hammond, Bancroft, and Dale P. Eddy, Flint, all of Mich., assignors to GMI Engineering & Management Institute, Flint, Mich.

Continuation-in-part of Ser. No. 162,650, Mar. 1, 1988, Pat. No. 4,860,594. This application Jun. 13, 1989, Ser. No. 365,619

Int. Cl.[5] G01F *1/20*

U.S. Cl. 73—861.42 **27 Claims**



1. A meter to measure fluid flow, comprising:

a conduit having an input, an output and a central region for fluid flow therebetween;

a nozzle having an inlet, a restricted outlet and a thin walled throughput region therebetween, said inlet sealingly cooperating with said conduit, said throughput region and said restricted outlet projecting into said central region, thereby allowing fluid in the central region to surround the nozzle therein, and wherein said throughput region elastically deforms circumaxially and longitudinally proportional to fluid flow; and

sensor means for measuring the elastic deformation of said throughput region caused by fluid flow and for providing a pressure deformation signal from which fluid flow may be determined.

4,986,136

MEASURING SYSTEM

Wolfgang Brunner, Ringenberg 175, D-8999 Maierhöfen, and Ludwig von Zech, Argensee, D-7964 Kissleg, both of Fed. Rep. of Germany

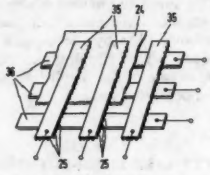
Filed Dec. 6, 1989, Ser. No. 446,990

Claims priority, application Fed. Rep. of Germany, Dec. 7, 1988, 8815246[U]

Int. Cl.[5] G01L *5/16, 1/14*

U.S. Cl. 73—862.04 **10 Claims**

1. A measuring system comprising: flexible mats of individual cells distributed in rows and columns of a matrix and being individually pollable for converting mechanical pressures applied locally on surfaces of said mats into electrical signals; each cell comprising a capacitor having a capacitance varying with the applied mechanical pressure; a source of voltage connectable to each said cell; each cell having an upper surface and a lower surface, said pressure being applied to said upper surface; a dielectric positioned between said upper surface and said lower surface; said upper surface having a plurality of parallel first strip-shaped areas with projections; said lower surface having also a plurality of parallel electrically conductive second strip-shaped areas extending at a substantially right angle to said first strip-shaped areas on one side of said dielectric for forming a capacitor cell at each intersection, said intersection deforming resiliently under applied pressure to vary said capacitance under pressure.



4,986,137

STRAIN DETECTOR WITH MAGNETOSTRICTIVE ELEMENTS

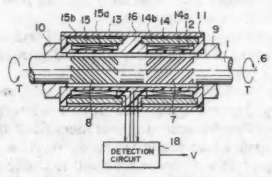
Hiroshi Sato; Yoshihiko Utsui; Hideo Ikeda, and Chiyo Hamamura, all of Amagasaki, Japan, assignors to Mitsubishi Denki Kabushiki Kaisha, Japan

Filed Dec. 1, 1989, Ser. No. 444,808

Claims priority, application Japan, Dec. 6, 1988, 63-309218; Dec. 6, 1988, 63-309219; May 17, 1989, 1-123313

Int. Cl.[5] G01L *3/10*

U.S. Cl. 73—862.36 **14 Claims**



1. A strain detector for detecting a strain developed in a cylindrical shaft, said strain detector comprising:

thin magnetostrictive elements, made of a soft magnetic material of a high permeability, attached to an outer circumferential surface of the shaft, the permeability of the magnetostrictive elements varying in accordance with a strain developed therein;

detection coil means, including a coil disposed around said shaft to surround the magnetostrictive elements, for detecting a variation of the permeability of the magnetostrictive elements;

a hollow cylindrical yoke, made of a soft magnetic material of a high permeability, disposed around said coil of the detection coil means across a radial gap formed between an outer surface of the coil and an inner surface of the cylindrical yoke; and

a hollow cylindrical magnetic shield disposed around said yoke across a radial gap formed between an outer surface of the yoke and an inner surface of the shield.

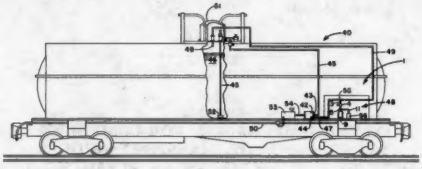
4,986,138
SAMPLE INJECTION MEANS

R. Wilson Spencer, P.O. Box 22586, Houston, Tex. 77227

Continuation-in-part of Ser. No. 287,344, Dec. 20, 1988, Pat. No. 4,879,915, which is a continuation of Ser. No. 26,824, Mar. 17, 1987, Pat. No. 4,791,821, which is a continuation-in-part of Ser. No. 720,166, Apr. 5, 1985, Pat. No. 4,651,574. This application Nov. 13, 1989, Ser. No. 435,563

Int. Cl.[5] G01N *1/14*

U.S. Cl. 73—864.34 8 Claims



1. In combination with a wheeled transport tank having a reservoir, a sample extraction system, comprising:

a. a suction line fixedly attached to said wheeled transport tank and extending into said reservoir;

b. a pump fixedly attached to said wheeled transport tank and having a suction port and a discharge port, said suction port being connected to said suction line;

c. a discharge line fixedly attached to said wheeled transport tank and connected to said discharge port;

d. a valve, connected to said discharge line;

e. a sample injection means, for receiving a sample from said discharge line, said sample injection means including a single vented needle having a body, said body having an upper end and a lower end, a needle shaft extending from said lower end, said shaft having a tip thereon, an injection passageway running through said body and communicating between the exterior of said body above said shaft and the exterior of said shaft, and a vent passageway, running through said body and communicating between the exterior of said body above said shaft and the exterior of said shaft, said sample injection means being connected at said upper end to said valve;

f. a return line, fixedly attached to said wheeled transport tank and connected on one end to said discharge line and terminating within said reservoir; and

g. a sample container, removably connectable to said sample injection means.

4,986,139
GYROSCOPE CONTROL SYSTEMS

Nigel F. Rennie, Bracknell, England, assignor to British Aerospace plc, Berks, England

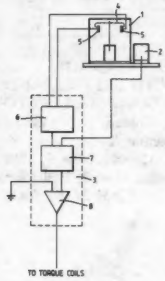
Filed Sep. 5, 1989, Ser. No. 402,191

Claims priority, application United Kingdom, Sep. 12, 1988, 8821370

Int. Cl.[5] G01C *19/28*

U.S. Cl. 74—5.4 5 Claims

1. In a gyroscope system comprising a gyroscope said gyroscope including a rotor, angle pick-off means arranged to sense tilt angles of said rotor, control means operatively connected to said angle pick-off means and arranged to receive a signal generated by said angle pick-off means and to generate a control signal and torque applying means operatively connected to said control means and arranged to torque said rotor in response to said control signal, said control means including a primary integrator arranged to integrate said signal generated by said angle pick-off means thereby generating said control signal, the improvement wherein said control means further comprise secondary integrator means operatively connected to said primary integrator and arranged to receive a signal from



said primary integrator thereby generating said control signal for said torque applying means.

4,986,140
DRAY TORQUE RELATIONSHIP OF A UNDIRECTIONAL CLUTCH IN AN ENGINE STATER MOTOR

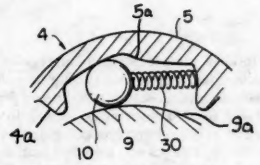
Akira Morishita, and Shuzoo Isozumi, both of Himeji, Japan, assignors to Mitsubishi Denki Kabushiki Kaisha, Tokyo, Japan

Filed Dec. 1, 1989, Ser. No. 444,264

Claims priority, application Japan, Dec. 2, 1988, 63-306568

Int. Cl.[5] F02N *15/00*

U.S. Cl. 74—7 C 3 Claims



1. An engine starter comprising:

an electric motor;

a unidirectional clutch connected to said motor and having an output shaft, said unidirectional clutch exhibiting a drag torque as said unidirectional clutch is being rotated in an idling direction;

a speed reduction unit connected to one end to said output shaft of said unidirectional clutch; and

a pinion shaft having a pinion gear for engaging and driving an engine ring gear and connected to said speed reduction unit through helical splines; wherein said drag torque satisfies the following equation:

$$T \leq To/g$$

where,

T: drag torque;

To: drag torque at which a return force F on the pinion shaft with an over-running clutch mounted thereon does not exceed on operating force on the pinion shaft by a solenoid; and

g: speed reduction ratio between the over-running clutch and the pinion shaft; and whereby

the arrangement being such that said drag torque of said unidirectional clutch as converted into a torque on said

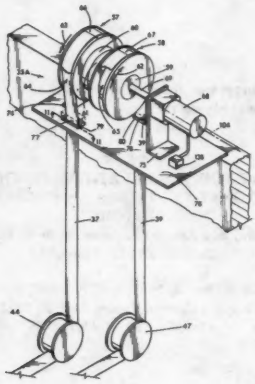
pinion shaft is equal to or smaller than a drag torque of a unidirectional clutch mounted on said pinion shaft, said torque on said pinion shaft as said pinion is driven being limited so as not to exceed an operating force acting on said pinion.

4,986,141

TAPE DRIVE WITH SELF-EXPANDING COILS FOR SLUDGE COLLECTOR

Charles L. Meurer, Golden, Colo., assignor to Baker Hughes Incorporated, Houston, Tex.

Division of Ser. No. 321,440, Mar. 9, 1989, Pat. No. 4,927,537.
This application Mar. 9, 1990, Ser. No. 491,198
Int. Cl.[5] F16H *21/40*; F03G *1/02*
U.S. Cl. 74—89.22 1 Claim



1. In a method of reciprocating a carriage having first and second opposite sides, said carriage being movable in first and second opposite directions, said method being performed using a drum mounted for rotation on an axis, a first reel having flanges and a first hub, said first reel being driven by said drum, a second reel having flanges and a second hub, said second reel being driven by said drum in the same rotary direction as said first reel is driven; the improvement comprising the steps of:

connecting a first end of a first metal tape to said first hub;

winding said first metal tape on said hub in a first rotary direction to form a first coil, said first tape being resilient and tending to uncoil itself on said hub of said first reel;

connecting a second end of said first tape to said first side of said carriage;

connecting a third end of a second metal tape to said second hub;

winding said second metal tape on said second hub in a second rotary direction to form a second coil, said second tape being resilient and tending to uncoil itself on said second hub of said second reel;

connecting a fourth end of said second tape to said second side of said carriage;

guiding said first and second tapes from said respective first and second reels in separate paths so that said first tape extends to said first side of said carriage and said second tape extends to said second side of said carriage;

rotating said drum and said first and second reels on said axis in first and second opposite rotary directions, said rotation in said first rotary direction being effective to tighten said first coil of said first tape on said first hub and apply tension to said first side of said carriage, and to permit said second coil of said second tape to uncoil itself on said second hub and to apply tension to said second side of said carriage, said tension applied to said first side exceeding that applied to said second side to move said carriage in said first direction, said rotation in said second rotary direction being effective to permit said first coil to uncoil itself on said first hub and to apply tension to said first side of said carriage, and to tighten said second coil on said second hub and to apply tension to said second side of said carriage, said tension applied to said second side of said carriage exceeding that applied to said first side to move said carriage in said second direction; and

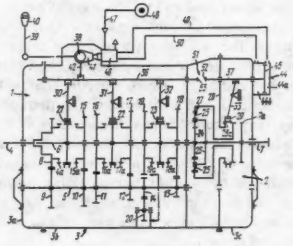
limiting the maximum diameter of said first and second coils to retain said first and second coils on said respective first and second reels.

4,986,142

CONTROL MECHANISM FOR COMPOUND TRANSMISSION OF TRANSPORT VEHICLE

Fedor N. Borodin, Ulitsa Marxistskaya, 9,kv.514; Solomon I. Gorfinkel, Klenovy bulvar,9/2,korpus 2,kv.II8, and Iosif Kurzel, ulitsa Miklukho-Maklaya,43,kv.77, all of, Moscow, U.S.S.R.

PCT No. PCT/SU88/00008, § 371 Date Aug. 30, 1989, § 102(e) Date Aug. 30, 1989, PCT Pub. No. WO89/06194, PCT Pub. Date Jul. 13, 1989
PCT Filed Jan. 7, 1988, Ser. No. 423,397
Int. Cl.[5] F16H *61/00, 63/00*
U.S. Cl. 74—473 R 3 Claims



1. A control mechanism of a compound transmission for a transport vehicle having a main gearbox (I) with a neutral position, a plurality of forward speed positions and a reverse speed position and tandemly connected to the main gear box, an auxiliary two-range gearbox (2) with a high-gear range position and a low-gear range position, comprising a hand lever (39), a casing (3), a first and a second slider (34, 35) slidingly arranged in said casing (3) for engaging a shifting means for forward speeds in the main gearbox (1), third slider (36) for engaging a shifting means for a reverse speed in the main gearbox (I) and a fourth slider (37) for engaging a shifting means for a low-gear range and a high-gear range in the auxiliary two-range gearbox, and a drive element (38) kinematically linked with the hand lever (39) for selective shifting of the first, second and third sliders (34, 35, 36) from the neutral position to the speed engaging positions and back, movably arranged in the casing (3), and an actuator (43) for shifting the fourth slider (37) into the low gear and high-gear positions, kinematically-linked with said drive element (38), wherein a device (51) for shifting the fourth slider (37) to the low-gear range position when the third slider (36) is moved from the neutral position to the speed-engaging position under the action of said drive element (38), said device comprising a first element (52) arranged for joint movement with the fourth slider (37) and a second element (53) arranged opposite the first element (52) for interaction therewith, said second element (53) being arranged for joint movement with the third slider (36).

4,986,143

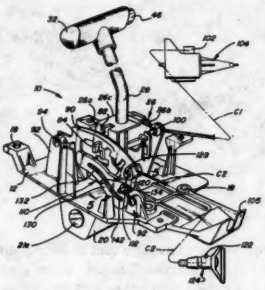
TRANSMISSION SHIFT CONTROL MECHANISM WITH PARK LOCK

Mikhail Livshits, Kentwood; Gerald J. Lafferty, Jr., Muskegon, and Donald R. Rempinski, Grand Haven, all of Mich., assignors to Sparton Corporation, Jackson, Mich.

Continuation of Ser. No. 137,759, Dec. 24, 1987, Pat. No. 4,938,158. This application Dec. 20, 1989, Ser. No. 453,592

Int. Cl.[5] F16H *63/36*

U.S. Cl. 74—475 5 Claims



1. In a transmission shift control mechanism for a vehicle having an ignition lock mechanism with a "Lock" position, the combination of:

a support base for securing to a vehicle, a shift lever means disposed on the support base for pivotal movement between a "Park" position and other operative positions, detent means for releasably coupling the shift lever means and support base to selectively retain said shift lever means in one of said "Park" position or other operative positions and for permitting, when actuated to decouple the shift lever means, repositioning of said shift lever means, and a locking mechanism including a locking lever pivotally disposed on the support base and operably connected to the ignition lock mechanism for movement about a pivot axis relative to the detect means to a locking position to prevent actuation of the detent means when the ignition lock mechanism is actuated to the "Lock" position with the shift lever means in the "Park" position and a locking member disposed on the shift lever means for movement along the locking lever to a cooperative position therewith when the shift lever means is positioned in the "Park" position where, at said cooperative position, the locking lever can pivot relative to the locking member to said locking position upon actuation of the ignition lock mechanism to the "Lock" position and to a non-cooperative position therewith when the shift lever means is positioned in said other positions where, at said non-cooperative position, the locking member prevents pivoting of said locking lever,

cable means comprising a cable operably interconnecting said ignition lock mechanism and said locking lever and an outer conduit disposed about the cable, said cable having a cable end connected to said locking lever, said conduit having a conduit end proximate the cable end and connected on said support base in fixed, nonadjustable relation to said pivot axis, and

said pivot axis of said locking lever defining a reference point on said transmission shift control mechanism relative to which said locking mechanism and said cable means are positioned such that upon assembly of said transmission shift control mechanism with said ignition lock mechanism in the vehicle, said locking mechanism, said cable means and said ignition lock mechanism are operably positioned without the need for relative adjustment between said shift control mechanism and said ignition lock mechanism.

4,986,144

MULTI-PLANE SETTING TYPE REDUCTION GEAR DRIVE STRUCTURE

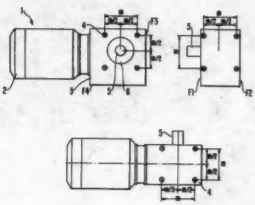
Toru Kobayashi, and Tsunetoshi Sonohara, both of Nagoya, Japan, assignors to Mitsubishi Jukogyo Kabushiki Kaisha, Tokyo, Japan

Filed May 10, 1989, Ser. No. 350,031

Claims priority, application Japan, Jul. 29, 1988, 63-99936[U]

Int. Cl.[5] F16H *57/02*

U.S. Cl. 74—606 R 2 Claims



1. A reduction gear drive structure comprising a housing for reduction gears, said housing having a shape defined by a motor supporting planar surface and an additional four planar supporting surfaces; a reduction gear drive shaft projecting longitudinally from said housing through one of said four planar supporting surfaces; a motor mounted to said housing at said motor supporting planar surface of said housing; and each of said four planar supporting surfaces defining a plurality of holes therein for receiving threaded fasteners to secure the housing to a support, the plurality of holes being arrayed in the same pattern and relative spacing in each of said four planar supporting surfaces, said pattern in which said plurality of holes are arrayed in each of said four planar supporting surfaces respectively having a center through which an axis passing perpendicular to the respective one of said four planar supporting surfaces intersects the longitudinal axis of said drive shaft, two of said four planar supporting surfaces of said housing defining pockets therein, one of said four planar supporting surfaces, extending between said two of said four planar supporting surfaces, and the holes defined in said one of said four planar supporting surfaces extending and being open to said pockets.

4,986,145

METHOD OF ENGINE MODEL DETERMINATION FOR USE IN AN ELECTRONICALLY-CONTROLLED AUTOMATIC TRANSMISSION

Hemang S. Mehta, Sterling Heights, Mich., assignor to Chrysler Corporation, Highland Park, Mich.

Filed Nov. 16, 1989, Ser. No. 437,238

Int. Cl.[5] B60K *41/04*

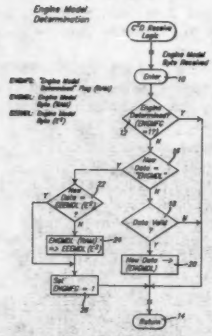
U.S. Cl. 74—843 4 Claims

1. In a vehicle having an engine, an electronic engine controller for controlling the response of the engine, a transmission control system including a transmission having a plurality of gears for transmitting power from the engine to the vehicle over desired ranges of torque and speed and an electronic transmission controller for controlling the shifting of the gears of the transmission, a communications interface to provide a communications link between the engine controller and the transmission controller, a method of determining a particular engine model of the engine from a plurality of engine models by the transmission controller for use in controlling the shifting of the transmission, said method comprising:

receiving data of a particular engine model by a transmission

controller across a communications interface from an engine controller;

determining whether the data received of the particular engine model equals a first predetermined engine model value stored in RAM;



comparing the data received to a plurality of predetermined engine model values stored in memory to determine if the data received is valid;

setting the first predetermined engine model value in RAM equal to the data received if the data received is valid; and

ending the method if the data received is not valid.

4,986,146

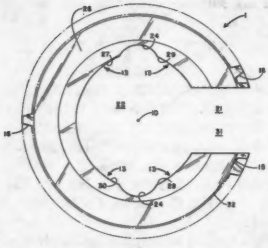
CAMMING MEMBER FOR POWER TONGS

David A. Buck, 118 Rue du Pain, Broussard, La. 70518

Continuation-in-part of Ser. No. 329,933, Mar. 28, 1989, abandoned. This application Mar. 13, 1990, Ser. No. 493,009

Int. Cl.[5] B25B *28/00*

U.S. Cl. 81—57.18 **8 Claims**



1. A camming member for power tongs, comprising a body including a central opening formed therein, said body being rotatable about a center point within said central opening, said body further including a means for positioning a tubular member within said central opening, said body further including at least one cam surface being adjacent to said central opening, said cam surface being formed such that, a distance between said centerpoint and said cam surface changes at a constant rate relative to angular change in the position of said camming member.

4,986,147

RATCHET WRENCH HAVING AN INTERNALLY REINFORCED HANDLE

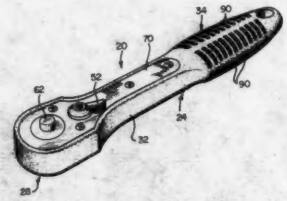
Gerald C. Cooper, Tien Mou, Taiwan, assignor to National Hand Tool Corporation, Dallas, Tex.

Filed Jan. 22, 1990, Ser. No. 468,377

Claims priority, application Taiwan, Jul. 20, 1989, 78206877; Jul. 20, 1989, 78206878

Int. Cl.[5] B25B *13/46*

U.S. Cl. 81—63.2 **12 Claims**



1. In a ratchet wrench having a tool head including a driving ring, a core rotatably journaled in said drive ring, selectively positionable pawl means coupled to said drive ring for controlling drive direction of said drive ring during use of said wrench, stud-like boss means connected to and extending downwardly from said core for attachment of interchangeable tool elements thereto, handle means extending from said tool head for manually transferring forces between said pawl and said drive ring for drivingly rotating said core and said boss means extending therefrom.

the improvement wherein said wrench has a body having hand-grip handle means and body means extending between said handle means and a head integrally formed therewith, said body being molded of a high-strength plastics material with reinforcing means embedded therein for further strengthening said wrench,

said body of said wrench being integrally formed at a driving end head zone of said wrench with a through opening for accommodating said core seated therewithin, and

wherein said reinforcing means includes bar means embedded in and extending longitudinally in said body including said handle means for imparting enhanced mechanical strength thereto.

4,986,148

DEVICE FOR REMOVING CASINGS AND COATINGS FROM GLASS FIBER CABLES

Josef Krampe, An der Vogelrute 32, 4715 Ascheberg-Herbern, Fed. Rep. of Germany

Filed Sep. 27, 1988, Ser. No. 249,853

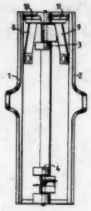
Claims priority, application Fed. Rep. of Germany, Oct. 29, 1987, 3736581

Int. Cl.[5] H02G *1/12*

U.S. Cl. 81—9.4 **7 Claims**

1. A device for removing casings and coatings from glass fiber cables, comprising two jaws which are movable relative to one another between a folded position in which they form a cylindrical hollow body with an axis for receiving a glass fiber cable and an unfolded position, said jaws having inner walls; two flat springs mounted on opposite sides of said axis on said inner walls of said jaws at a distance form one end side of said jaws and turnable toward one another from a point of mounting; and two cutters supported on said flat springs and having cutting edges which extend transversely to said axis and oppo-

sitely to said flat springs at an acute angle to said axis and directly abut against one another on said axis, said flat springs



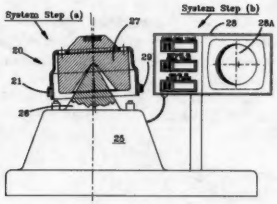
being arranged to spring-bias said cutters toward said axis and, therefore, toward a glass fiber cable.

4,986,149

SYSTEM FOR FINAL BALANCING OF CAST METAL BRAKE DRUMS

Edwin L. Carmel, Cincinnati; Robert A. DeRegnaucourt, Centerville, and Lee Reichel, Kettering, all of Ohio, assignors to Dayton-Walther Corporation, Dayton, Ohio

Filed Apr. 10, 1989, Ser. No. 335,431
Int. Cl.[5] B23B *1/00, 5/02, 25/06*
U.S. Cl. 82—1.11 **8 Claims**



1. A system for production of foundry cast metal brake drums (20) with a squealer band (21) and other outside surfaces which have been first machined to designed dimensions, said system using a conventional static balancer (25) and a conventional turning lathe (30) with an adjustable chuck (31) for positioning and clamping a first machined brake drum 20 and an incrementally adjustable cutting tool (32) for removing metal from outer surface areas of a first machined brake drum 20 on said lathe chuck 31, said system comprising of steps of:

(a) determining on said static balancer 25 whether a first machined brake drum 20 has an acceptable final balance, and if the first machined brake drum 20 has a determined imbalance which is not acceptable;

(b) recording by a sensor unit (28) integrated with said static balancer 25 an analog or datum figure for the ounce/inch value of the determined imbalance of said drum 20 when on said static balancer 25; while,

(c) observing when viewing said drum 20 on said balancer 25 an imaginary line extending from the axis of said balancer 25 toward the apparent center of the determined imbalance; and,

(d) marking a reference point (29) for said observed imaginary line on an outer surface of said drum 20 at a point opposite the apparent center of imbalance, and then transferring said marked drum (20+29) to said turning lathe 30; and,

(e) clamping said marked drum 20+29 in said adjustable chuck 31 in a determined position established by the analog or datum figure for the ounce/inch value recorded using said sensor unit 28 integrated with said static balancer 25; while,

(f) aligning the position of said drum 20 in said chuck 31 so that said reference point 29 marked on an outer surface of a drum 20 is opposite to the leading edge of said cutting tool 32; and, finally,

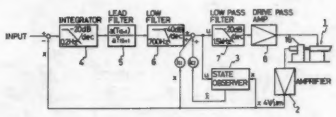
(g) turning said lathe chuck 31 so that said cutting tool 32 will incrementally cut away an outer surface of a drum 20 to a depth established by an analog or datum figure for the ounce/inch value determined and recorded using said sensor unit 28 integrated with said static balancer 25.

4,986,150

MICRO-POSITIONING TOOL POST

Yuichi Okazaki, Tsukuba, Japan, assignor to Agency of Industrial Science & Technology and Ministry of International Trade & Industry, both of Tokyo, Japan

Filed Mar. 13, 1989, Ser. No. 322,725
Claims priority, application Japan, Mar. 31, 1988, 63-80083
Int. Cl.[5] B23B *21/00*
U.S. Cl. 82—137 **4 Claims**



1. A micro-positioning tool post comprising:

a tool stage which supports a tool and is supported on a flexible support so that the tool stage performs motion parallel to said flexible support;

a piezoeletric actuator for displacing said tool stage;

a displacement sensor for detecting displacement of said tool stage;

a state observer which is a dynamical system for computing an estimate of a velocity signal of said tool stage from a voltage applied to said piezoelectric actuator and an output from said displacement sensor; and

means for feeding said estimate of the velocity signal back to the voltage applied to said piezoelectric actuator;

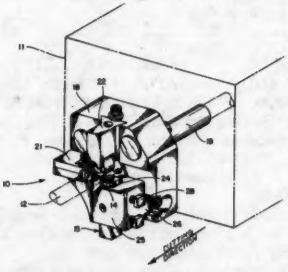
whereby said tool may be micro-positioned relative to a work piece.

4,986,151

TOOL HOLDER FOR A SCREW MACHINE BOX TOOL

Daniel T. Horn, 1633 N. Normandy, Chicago, Ill. 60635

Filed Apr. 17, 1989, Ser. No. 338,854
Int. Cl.[5] C23B *16/04*
U.S. Cl. 82—157 **9 Claims**



1. A tool holder for right and left hand small diameter screw machine box tools of the type having a housing with a through bore for work travel on an axis and a tool holder clamp on the

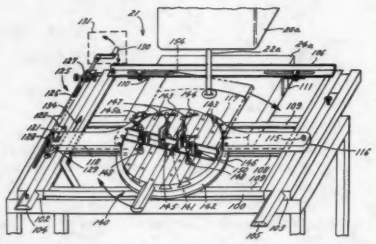
housing offset from the through bore with a clamp opening generally transverse to the through bore and the work, comprising: an elongated tool holder having a longitudinal axis adapted to fit in the clamp opening and be clamped to the housing, a polygonal insert recess on a working end of the tool holder lying in a plane generally transverse to the holder axis, and a carbide insert having multiple cutting edges mounted in the recess generally transverse to the longitudinal axis of the tool holder, said insert having at least two adjacent, opposed, and identical cutting surfaces, said recess and insert being constructed and mounting so that the opposed identical cutting surfaces on the insert overhang opposite sides of the tool holder in mirror image fashion whereby the tool holder can be used in both right and left hand box tools without indexing the carbide insert.

4,986,152

CURVE CUTTING METHOD AND APPARATUS

Marvin L. Sammons, 6779 Fargo Rd., Avoca, Mich. 48006

Filed May 30, 1990, Ser. No. 530,211
Int. Cl.[5] B26D *1/00, 7/06;* B27C *5/00*
U.S. Cl. 83—13 **19 Claims**



1. A fixture for use with a power driven cutting tool, for cutting a defined curve in a workpiece, the curve having at least one defined axis, the fixture comprising, in combination:

a base adapted to be positioned in a predetermined orientation with respect to the cutting tool,

a pivot arm for supporting the workpiece for presentation to the cutting tool,

first pivot means for mounting the pivot arm with respect to the base such that the pivot arm is pivotable toward the cutting tool in an arc centered at the first pivot point,

a second pivot point on the pivot arm for providing rotation of the workpiece about the second pivot point, and

stop means for defining a working position of the pivot arm in which the workpiece and the cutting tool are displaced by a distance corresponding to said axis sc, that the cutting tool is positioned to cut said defined curve upon rotation of the workpiece.

4,986,153

METHOD AND APPARATUS FOR THE PARTING AND REMOVAL OF PIECES FROM PUNCH PRESSES

Edgard Matrak, Tonawanda, and Robert L. Hess, Clarence, both of N.Y., assignors to Strippit Inc., Akron, N.Y.

Filed Sep. 5, 1989, Ser. No. 402,887
Int. Cl.[5] B26D *7/18*
U.S. Cl. 83—25 **16 Claims**

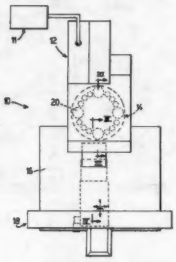
16. A method of forming and removing a piece from a sheet of material at a work station of a multi-tool punch press, said method comprising the following steps:

bringing a punching tool into alignment at said work station;

actuating said punching tool to form a piece of material in said sheet, said piece of material being attached to said sheet by at least one table;

bringing a separation means for parting said piece from said sheet, and a hold-down means for holding the parted piece and said sheet in coplanar relation, into operating position at said work station;

actuating said separation means to part said piece from said sheet, and actuating said hold-down means to hold the parted piece and said sheet in coplanar relation;



moving said parted piece and said sheet to a position where said piece overlies a closed drop door; and

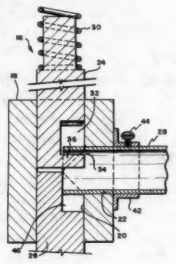
opening said drop door and permitting said parted piece to fall away from said sheet.

4,986,154

TOOL FOR CUTTING IN TUBE ENDS AND METHOD

Lorenzo Vernacchio, Philadelphia, Pa., assignor to The Boeing Company, Seattle, Wash.

Filed Sep. 29, 1989, Ser. No. 415,157
Int. Cl.[5] B23D *21/14;* B26D *3/14*
U.S. Cl. 83—54 **5 Claims**



1. A method of forming a contour cut in a tube end, the tube end having an interior surface and an exterior surface, comprising the steps of:

inserting a tube end within a contour cutting tool means;

applying with said tool means, a force against a portion of the interior surface of the tube end while restraining a corresponding portion of the exterior surface of the tube end, causing said tube end in engagement with said tool means to be cut by shearing;

rottating the tube end 180° .

inserting the rotated tube end within the contour cutting tool means; and

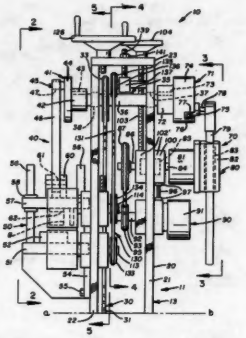
applying, with said tool means, a force against the remaining portion of the interior surface of the tube end while restraining a corresponding portion of the exterior surface of the tube end causing said tube end in engagement with said tool means to be cut by shearing.

4,986,155

CUTTING APPARATUS FOR EXTRUDED MATERIALS

Donald F. Hays, Jr., Silver Lake Village, Ohio, assignor to Extrusion Services, Inc., Stow, Ohio

Filed Oct. 11, 1988, Ser. No. 255,971
Int. Cl.[5] B26D 5/20
U.S. Cl. 83—222 14 Claims



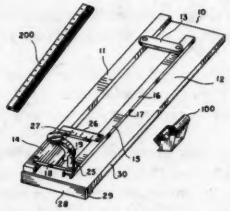
1. Apparatus for repeatedly cutting extruded rubber and plastic material at preselected locations along a length thereof comprising, frame means, drive shaft means mounted on said frame means, drive means effecting a selected speed of rotation of said drive shaft means, feed roll means intermittently driven by said drive shaft means for controllably incrementally advancing the extruded material, cutting means driven by said drive shaft means for repeatedly cutting the extruded material advanced by said feed roll means at the preselected locations, and indexing means having clutch means intermittently connecting said drive shaft means and said feed roll means and having indexing crank means interposed between said drive shaft means and said clutch means, said indexing crank means includes a crank shaft attached to said drive shaft means, a crank wheel affixed to the crank shaft, a crank pivot block attached to said crank wheel, a crank pin extending from said crank pivot block, and a crank rod attached to said crank pin and movable longitudinally in pillow block means attached to the input shaft of said clutch means for imparting oscillating motion to said pillow block means.

4,986,156

MAT CUTTING DEVICE

Michael J. McGinnis, 887 Boyd St., Santa Rosa, Calif. 95407

Filed Apr. 13, 1990, Ser. No. 508,658
Int. Cl.[5] B26D 7/01, 7/26
U.S. Cl. 83—467.1 7 Claims



1. A cutting assembly for sizing and cutting mats for flat artwork, including:

a flat horizontal base surface having upper and lower surfaces;

a first stop means affixed atop said flat horizontal base surface on said upper surface for placing an edge of a flat planar mat against;

two pivoting arms pivotally connected at one end to said first stop means, said pivoting arms disposed at substantially opposite ends of said first stop means;

a guide member pivotally connected to said pivoting arms other ends, said first stop means and said guide member being in parallel relationship at all times;

locking means disposed on one of said pivoting arms to lock said pivoting arms and said guide member in place; whereby

a mat is placed against said first stop means and under said guide member with said guide member being moved to an appropriate position and locked in place by said locking means, a cut then being made by a cutting tool using said guide member as guide; and

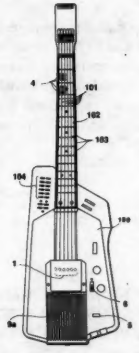
a straight surface normal to said horizontal base surface affixed to said lower surface, said straight normal surface providing a second stop for large planar sheets of material when said cutting assembly is placed atop the sheets of material, thus allowing straight cuts to be made in the sheets of material.

4,986,157

ELECTRONIC MUSICAL INSTRUMENT WITH A FRET-SPLIT FUNCTION

Akinori Matsubara, Tachikawa, Japan, assignor to Casio Computer Co., Ltd., Tokyo, Japan

Filed Dec. 11, 1989, Ser. No. 448,808
Claims priority, application Japan, Dec. 28, 1988, 63-332112[U]
Int. Cl.[5] G10D 3/06, 1/08
U.S. Cl. 84—646 16 Claims



1. An electronic musical instrument comprising:

a finger board having a plurality of fingering areas which are arranged in parallel;

a plurality of frets provided on said finger-board, and arranged at predetermined intervals and at right angles to the longitudinal direction of said fingering areas;

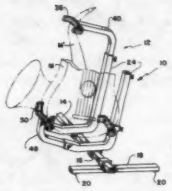
tone-pitch designating means for designating a tone pitch corresponding to fret position where fingering operation is executed, in response to fingering operation on said plurality of frets; and

tone-color assigning means for dividing said fingering areas on the basis of one or more particular frets among a plurality of said frets and for assigning same or different tone colors to the divided fingering areas, respectively.

4,986,158
MODULAR MULTIPLE MUSICAL INSTRUMENT STAND

Stefan J. Johnson, R.R. 1, Box 141, Warren, Minn. 56762

Filed Feb. 23, 1989, Ser. No. 314,111
Int. Cl.[5] G10G 5/00
U.S. Cl. 84—327 11 Claims



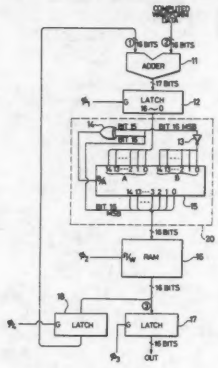
1. A modular multiple musical instrument stand comprising;
a base assembly,
said base assembly having a lateral crossmember parallel to the major axis of said musical instrument stand,
said lateral crossmember supported by longitudinal support legs at each of said lateral crossmember.
said lateral crossmember providing support for a plurality of instrument support assemblies each aligned in the vertical plane and perpendicular to said major axis of said musical instrument stand,
said instrument support assemblies each having first, second, and third instrument support members,
said instrument support members positioned non linearly upon said instrument support assemblies so as to provide at least three points of support for musical instruments supported by each of said instrument support assemblies, whereby
said three support points defines a vertical plane perpendicular to said major axis of said musical instrument stand and support any musical instrument placed therein so that the narrowest dimension of said musical instrument is oriented parallel to said major axis of said musical instrument stand in order to conserve space within said musical instrument stand.

4,986,159
ELECTRONIC MUSICAL INSTRUMENT WITH DATA OVERFLOW DETECTOR AND LEVEL LIMITED DATA SELECTION CIRCUIT

Tadashi Matsushima, and Tsutomu Saito, both of Shizuoka, Japan, assignors to Kabushiki Kaisha Kawaigakki Seisakusho, Shiz, Hamamatsu, Japan

Continuation of Ser. No. 218,236, Jul. 12, 1988, abandoned. This application Dec. 20, 1989, Ser. No. 456,218
Claims priority, application Japan, Aug. 13, 1987, 62-202171
Int. Cl.[5] G10H 1/08
U.S. Cl. 84—660 6 Claims

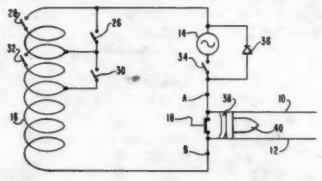
1. A digital electronic musical instrument which synthesizes a musical waveform by computing, comprising:
musical waveform generating means for generating musical waveforms through computation;
adding means for adding together the musical waveforms generated by said musical waveform generating means; and
limiter circuit means for receiving an added musical waveform from said adding means, detecting the existence of an overflow condition and delivering said added musical waveform if no overflow condition is detected and delivering a preset maximum value waveform signal when an overflow condition is detected.



4,986,160
BURST FIRING ELECTROMAGNETIC LAUNCHER UTILIZING VARIABLE INDUCTANCE COILS

George A. Kemeny, Pittsburgh, Pa., assignor to Westinghouse Electric Corp., Pittsburgh, Pa.

Filed Nov. 22, 1982, Ser. No. 443,730
Int. Cl.[5] F41B 6/00
U.S. Cl. 89—8 25 Claims



1. An electromagnetic projectile launcher comprising:
a pair of conductive rails, having a breech end and a muzzle end;
a source of high current including an inductive energy storage means having an initial inductance of sufficient magnitude to store enough energy to launch a plurality of projectiles;
a switch electrically connected across the breech end of said pair of conductive rails, for switching current from said source of high current to said pair of conductive rails to launch a first one of said plurality of projectiles; and
means for reducing the inductance of said inductive energy storage means following a launch of said first projectile and after said switch has closed, to increase current flow through said inductive energy storage means and through said switch in preparation for a launch of a second one of said plurality of projectiles.

4,986,161

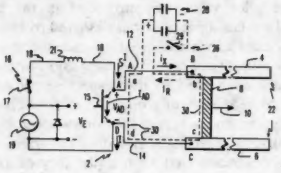
APPARATUS AND ASSOCIATED METHOD FOR REDUCING ELECTRICAL SWITCH ARCING

Dean Schron, Pittsburgh; George A. Kemeny, Wilkins Twp., Allegheny County; Dennis Pavlik, Murrysville, and Francesco Stefani, Pittsburgh, all of Pa., assignors to Westinghouse Electric Corp., Pittsburgh, Pa.

Filed Dec. 15, 1988, Ser. No. 284,565

Int. Cl.[5] F41B *6/00*

U.S. Cl. 89—8 **3 Claims**



1. Apparatus for rapidly reducing the magnitude of current in a first portion of a first electrical circuit while simultaneously increasing the magnitude of current in a second portion of the first electrical circuit comprising:

first electrical circuit with a first current flowing in a first direction through said first portion; and

second electrical circuit operatively associated with said first electrical circuit for producing a second current in said first portion and said second portion of said first electrical circuit;

said second current flowing through said first portion in the opposite direction of said first direction;

said second electrical circuit induces said second current in said first electrical circuit;

said second electrical circuit includes means for reducing the net magnitude of current in said first portion to substantially zero; and

said second electrical circuit includes capacitor means for producing said second current, whereby said second current rapidly reduces the net magnitude of current flowing in said first portion and simultaneously increases the magnitude of current in said second portion.

4,986,162

BLOCKING DEVICE TO INTERRUPT MOVEMENT OF A WEDGE-TYPE BREECHBLOCK

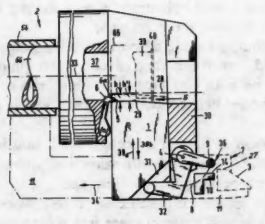
Gerd Wissing, Dusseldorf, Fed. Rep. of Germany, assignor to Rheinmetall, Düsseldorf, Fed. Rep. of Germany

Filed Nov. 8, 1989, Ser. No. 433,337

Claims priority, application Fed. Rep. of Germany, Nov. 23, 1988, 3839496

Int. Cl.[5] F41A *3/10*

U.S. Cl. 89—24 **10 Claims**



1. A wedge-type breechblock arrangement for a gun having a bore axis and a breech end provided with a breech-ring, the gun being mounted on a gun cradle and comprising:

a breech wedge movable in the breech-ring transversely to the bore axis of the gun for opening and closing the breech end of the gun;

a ramp mounted on the cradle;

a breech-opening shaft connected with said breech wedge in a form-locking manner;

a run-up lever fixed to said breech-opening shaft and in operative engagement with said ramp during an opening movement of said breech wedge;

holding means for holding said breech wedge in an open position and for releasing said breech wedge to initiate movement to closed said breech wedge; and

blocking means fixed to the cradle and including a pivotally mounted blocking lever for pivoting into the path of movement of said run-up lever to block movement of said breech-opening shaft for limiting a first partial closing movement of said breech wedge.

4,986,163

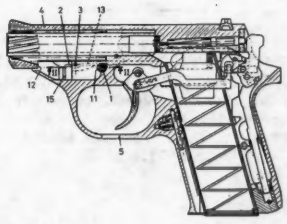
SLIDE ARRESTING DEVICE AT A HANDGUN

Martin Tuma, Solothurn, Switzerland, assignor to ITM Industrial Technology & Machines AG and Sphinxwerker Muller AG, both of Solothurn, Switzerland

Filed Jan. 4, 1990, Ser. No. 460,769

Int. Cl.[5] F41A *11/00*

U.S. Cl. 89—196 **2 Claims**



1. A slide arresting device for a handgun having a slide supported and guided for longitudinal movement along a frame of the gun, said slide arresting device comprising:

an elongate arresting pin for insertion in a bore of a frame of a handgun and having a recessed circumferential section;

and an elongate flexible pin-locking spring for support on said frame, biasing into said recessed circumferential section, and locking said elongate arresting pin against longitudinal and rotational movement relative to said frame;

said elongate arresting pin comprising at one end a planar, flat head and at an opposite end a chamfered section a bottom of which extends at least approximately tangentially relative to the circumference of said elongate arresting pin, and a planar jacket section which, in the inserted and locked state of said elongate arresting pin, is aligned with and faces an abutment surface at a slide of a gun, whereby the extent of the recoil movement of the slide relative to the frame of the gun is limited.

4,986,164

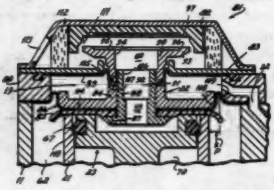
PNEUMATIC GUN HAVING IMPROVED FIRING VALVE

John P. Crutcher, Cincinnati, Ohio, assignor to Senco Products, Inc., Cincinnati, Ohio

Continuation of Ser. No. 225,348, Jul. 28, 1988, abandoned, which is a continuation of Ser. No. 130,303, Dec. 9, 1987, abandoned, which is a continuation of Ser. No. 503,843, May 31, 1988, Pat. No. 4,747,338. This application Jun. 13, 1989, Ser. No. 365,759

Int. Cl.[5] F15B *11/08*

U.S. Cl. 91—461 12 Claims



1. A fastener driving tool having a firing valve mounted therein for selectively introducing a sufficient volume of pressurized gas into an expansible chamber for moving a piston therein to drive a fastener, and having a firing valve chamber for selective connection between the atmosphere to open the firing valve for operating the tool to drive a fastener, and a source of gas above atmospheric pressure to maintain the firing valve in closed position, the improvement comprising:

first and second rolling seals disposed in said tool and defining between them said firing valve chamber,

said first and second rolling seals each having a convolution disposed between said firing valve and adjacent surfaces of said tool,

said first and second rolling seals independently supporting said firing valve for movement in said tool.

4,986,165

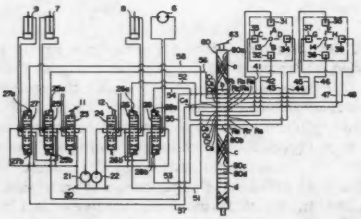
HYDRAULIC SHOVEL CONTROL CIRCUIT WITH OPERATING PATTERN SWITCHING VALVE

Satoshi Miyaoka, Hiroshima, Japan, assignor to Kabushiki Kaisha Kobe Seiko Sho, Kobe, Japan

Filed Aug. 29, 1989, Ser. No. 400,019

Int. Cl.[5] F15B *13/08*

U.S. Cl. 91—529 4 Claims



1. An operating apparatus for a hydraulic shovel, comprising:

pilot type control valves for controlling the operation of actuators for work elements including a boom cylinder, an arm cylinder, a bucket cylinder and a swing motor;

pilot valves of a number corresponding to pilot ports of the control valves;

a plurality of operating levers operatively connected to said pilot valves for operating the pilot valves; and

a single operating pattern switching valve connected to fluid conduits for fluidically connecting the pilot port of each control valve with a selected pilot valve, wherein said operating pattern switching valve comprises a casing, a rotary spool inserted into said casing so as to be rotatably displaceable into plural angular positions within a predetermined angular range, wherein a plurality of input ports of said switching valve individually connected to the respective pilot valves are provided in the peripheral surface of the casing at positions deviated from each other in axially and circumferentially spaced apart relation, wherein a plurality of output ports of said switching valve individually connected to the respective pilot ports are arranged to be diametrally opposed to respective ones of the inlet ports, and wherein the rotary spool is provided with a plurality of passages including a plurality of diametral holes communicated with a plurality of axial holes, whereby a connecting relationship between each input port and each output port of said switching valve is converted by rotation of said rotary spool.

4,986,166

HYDRAULIC VALVE LASH ADJUSTER

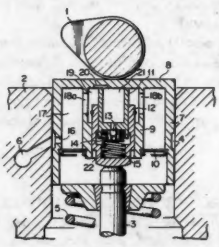
Toshimitsu Shida, Fujisawa, Japan, assignor to Fuji Valve Co., Ltd., Tokyo, Japan

Filed Sep. 26, 1989, Ser. No. 412,500

Claims priority, application Japan, Mar. 28, 1989, 1-35338

Int. Cl.[5] F01B *7/20*

U.S. Cl. 92—52 2 Claims



1. A hydraulic valve lash adjuster comprising:

a cylindrical body having a closed upper end, defined by an upper end wall, a lower end and a longitudinal axis;

a cylindrical sleeve mounted to said upper end wall of said body and extending coxially with said longitudinal axis of said body, said cylindrical sleeve having a plurality of openings defined therethrough;

an outer plunger having a bottom wall defining a lower end face, said lower end face of said outer plunger being in contact with an end face of the engine valve stem, said outer plunger being slidably disposed within said cylindrical sleeve;

an inner plunger having a bottom wall, said inner plunger being slidably received with said outer plunger and having a reservoir defined therewithin; and

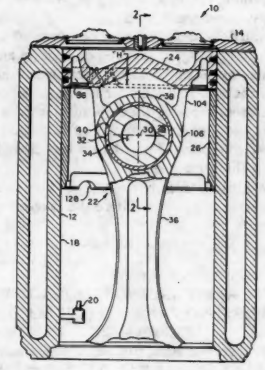
check valve means for permitting oil to flow only from said reservoir in said inner plunger into a high-pressure chamber defined between said bottom wall of said inner plunger and said bottom wall of said outer plunger.

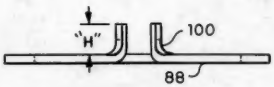
4,986,167

ARTICULATED PISTON WITH A COOLING RECESS HAVING A PREESTABLISHED VOLUME THEREIN

Michael Stratton, Peoria, and Clifford O. Jeske, Brimfield, both of Ill., assignors to Caterpillar Inc., Peoria, Ill.

Filed May 25, 1989, Ser. No. 356,489
Int. Cl.[5] F01B 31/08
U.S. Cl. 92—186 30 Claims





1. An articulated piston assembly including a piston member and a skirt portion adapted for use in an engine comprising:

the piston member having an upper portion and a lower portion; said upper portion being substantially cylindrical in shape and having a peripheral top surface, a tubular wall depending from the top surface, an outwardly facing wall portion and a downwardly facing annular cooling recess; and said lower portion including a pair of depending pin bosses blendingly associated with the outwardly facing wall portion, said pin bosses individually defining a wrist pin receiving bore aligned on a central axis;

the skirt portion positioned about the lower portion of the piston member and having a pair of wrist pin receiving bores aligned with the central axis;

a wrist pin disposed in the pair of wrist pin receiving bores of the skirt and the wrist pin receiving bores in the lower portion of the piston member attaching the skirt to the piston member; and

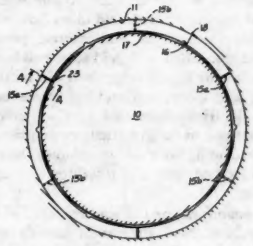
at least one baffle plate positioned in the annular cooling recess and fixedly sealingly attached to the tubular wall and the outwardly facing wall portion of the upper portion of the piston member in heat conducting relationship forming a cooling gallery having a preestablished trapped volume and at least one opening therein.

4,986,168

PISTON AND MULTILAYER PISTON RING SET

Robert Geffroy, 1 Boulevard Richard Wallace, 92200 Neuilly s/Seine, Paris; Christophe Geoffroy, 18 rue Charles Laffitte, 92200 Neuilly/Seine, both of France, and Lloyd M. Forster, 1827 Golf Ridge Dr., Bloomfield Hills, Mich. 48013

Filed Jan. 3, 1989, Ser. No. 293,072
Int. Cl.[5] F16J 9/06, 9/16, 9/24
U.S. Cl. 92—194 18 Claims



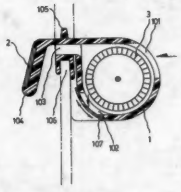
1. An assembly comprising a cylinder for internal combustion engine or compressor extending between a compression head and a crank case, a piston, and piston ring set reciprocable within said cylinder characterized by a single pair of contiguous layers, each equally circumferentially segmented in equal circular arc segments providing metal compression ring means in a single piston groove with free axial clearance, each segment being provided with free form circumferential curvature substantially equal to said cylinder wall, further characterized by said pair of segmented metal ring layers within said single groove having interlayer sealing means against blowby, and resilient means for maintaining light dual layer radial ring segment contact pressure against each cylinder wall.

4,986,169

VEHICULAR INTERNAL FAN VENTILATOR

Ming-Hsiung Chen, 7F, 16, Alley 3, Lane 227 Nung-An Street, Taipei, Taiwan

Filed Sep. 22, 1989, Ser. No. 410,757
Int. Cl.[5] B60H 1/24
U.S. Cl. 98—2.02 2 Claims



1. A portable air ventilator device mountable on the window of a vehicle and for use with batteries comprising:

a one-piece housing having an external portion and an internal portion, said internal portion to be situated inside said vehicle, said external portion to be situated outside said vehicle, said housing having a top end, said top end situated toward a ceiling of said vehicle, said external portion being integrated with the overall housing and linked and connected to the internal portion at the top end of the housing structure and being set obliquely with respect to said window;

retaining means for securely holding said ventilator between said window and the window frame of the vehicle;

a ventilating chamber defined in said internal portion of said housing, said chamber having a top end and a bottom end, said top end of said chamber situated toward the ceiling of said vehicle, said bottom end situated opposite said top end away from said ceiling;

one cross-flow air fan within said ventilating chamber;

a solar cell board fixedly mounted to said obliquely arranged external portion, and set adjacent to said window of said vehicle and associated with said cross-flow air fan;

powering means defined in said internal portion of said housing and associated with said solar cell board and said fan, said powering means comprised of a motor and selector switch; said motor and said batteries receiving light-converted electricity from said solar cell board;

an air inlet defined in said internal portion of said housing and communicating with said ventilating chamber, said air inlet being located such that it will be near the ceiling of said vehicle;

an exhaust opening defined in said external portion of said housing and communicating with said air inlet through said ventilating chamber and air outside said vehicle, said exhaust opening being defined in part by said external wall portion so that air is expelled generally alongside and parallel to said window upon which said ventilator device is mounted;

an air outlet defined in said internal portion of said housing and communicating with said ventilating chamber, said air outlet defined in said housing so that it is angled toward said window of said vehicle so that air will move by said window; and

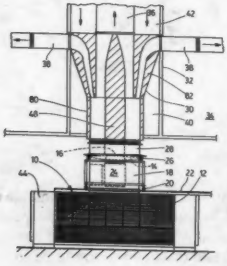
one sliding cover attached to said housing for movement between a first position in which said sliding cover seals in a manner that enables the circulation of internal and external air within said vehicle and a second position in which said sliding cover seals to enable circulation of internal vehicular air only, said portable air ventilator device being immediately transferrable between different window sizes and different vehicular models.

4,986,170

AIR HANDLING SYSTEM

Ramani Ramakrishnan, Toronto, and Norman Ball, Ottawa, both of Canada, assignors to M & I Heat Transfer Products Ltd., Mississauga, Canada

Filed Sep. 21, 1989, Ser. No. 429,534
Int. Cl.[5] F24F 7/08
U.S. Cl. 98—33.1 **9 Claims**



1. A branch take-off airflow device for use in an air distribution system that includes coaxial input and output ducts and one or more branch ducts angularly offset from said input and output ducts, said device comprising:

a static pressure regain section having an air passageway with an input port of a size substantially the same as the outlet of said input duct and an output opening,

a take-off section including a central passageway and one or more take-off passageways, said central passageway having an output port of a size substantially the same as an inlet of said output duct, each of said one or more take-off passageways being generally rectangular in transverse cross-section and defined by inner and outer walls with said outer wall being a continuation of a wall defining said output opening of said regain section, wherein said inner wall has a thick, rounded leading edge where the take-off passageway commences; and

an elongate airflow defining member located centrally in both said passageway of said regain section and said central passageway of said take-off section and extending in the axial direction, said member having a generally round transverse cross-section, which is substantially uniform in said regain section, the diameter of said member in said take-off section being equal to or less than its uniform diameter in the regain section;

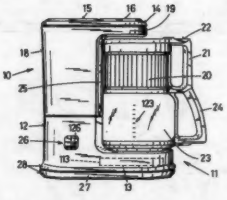
wherein said airflow defining member extends axially past said rounded leading edge where the take-off passageway commences.

4,986,171

DEVICE FOR REINFORCING LIQUID-DISPENSING CONTAINERS IN APPARATUS FOR MAKING HOT BEVERAGES

Hans-Jürgen Precht, Solingen, Fed. Rep. of Germany, assignor to Robert KRUPS Stiftung & Co. KG, Solingen, Fed. Rep. of Germany

Filed Feb. 23, 1989, Ser. No. 315,458
Claims priority, application Fed. Rep. of Germany, Feb. 26, 1988, 3806113
Int. Cl.[5] A47J 31/00
U.S. Cl. 99—279 **15 Claims**



1. Apparatus for making hot beverages, such as coffee or tea, comprising a housing; a liquid-dispensing container carried by said housing, said container having an open top and a marginal portion surrounding said open top; means for reinforcing said container in the region of said open top, including a separately produced frame surrounding said open top and carried by said marginal portion; a closure for said open top; and means for movably connecting said closure to said frame, said closure including at least one lid and said connecting means including a hinge pivotally connecting said at least one lid to said frame.

4,986,172

BEVERAGE BREWING APPARATUS

Clyde J. Hunnicutt, Jr., 3026 E. Garfield St., Phoenix, Ariz. 85008

Continuation-in-part of Ser. No. 189,372, May 2, 1988, abandoned. This application May 18, 1989, Ser. No. 354,226
Int. Cl.[5] A47J 31/00
U.S. Cl. 99—306 **31 Claims**

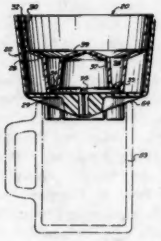
1. An adapter for use in combination with a beverage making machine, which machine includes

liquid dispensing means, and

a basket having a liquid pervious bottom and having an open top for receiving liquid from the dispensing means,

said basket normally receiving and holding a filter having beverage making material therein,

said machine normally utilizing a standard quantity of liquid and a standard quantity material to yield a standard quantity of beverage,



said adapter being configured for placement within said basket to produce a selected lesser quantity of beverage and comprising:

(a) a liquid pervious receptacle for receiving and holding a selected quantity of said material;

(b) a reservoir for receiving liquid from said dispensing means and communicating with said receptacle; and

(c) means for demountably connecting said receptacle to said reservoir.

4,986,173

ELECTRIC BREAD TOASTER

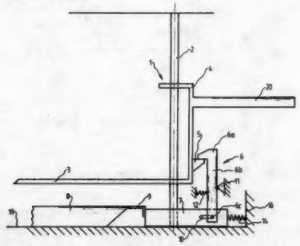
Andrea Hahnewald, Egelsbach; Georg Möthrath, Gelnhausen; Stefan Schamberg, Oberursel, and Volker Ullrich, Hanau, all of Fed. Rep. of Germany, assignors to Braun Aktiengesellschaft, Kronberg, Fed. Rep. of Germany

Filed Aug. 29, 1989, Ser. No. 399,912

Claims priority, application Fed. Rep. of Germany, Sep. 9, 1988, 3830632

Int. Cl.[5] A47J *37/08*

U.S. Cl. 99—338 **10 Claims**



1. An electric bread toaster comprising a housing, structure in said housing defining a toasting chamber, an electric heating unit in said housing, carriage structure in said housing movable between a receiving position and an operating position, a handle portion coupled to said carriage structure, spring structure in said housing for biasing said carriage structure towards said receiving position, guideway structure in said housing and cooperating with said carriage structure for guiding movement of said carriage structure between said receiving position and said operating position, said carriage structure being displaceable by means of said handle portion along said guideway structure and against spring action of said spring structure from said receiving position into said operating position, toast rack structure carried by said carriage structure for downward movement within said toasting chamber, a crumb collecting tray which extends below said toast rack structure and is insertable into an end position in said housing, said carriage structure being required to be brought into its said operating position for energization of said heating unit, a locking mechanism for holding said carriage structure in said operating position for the duration of the toasting cycle, a first device for preventing energization of said heating unit when said crumb collecting tray is not fully inserted to its said end position inside said housing, and a second device for rendering said locking mechanism ineffective on removal of said crumb collecting tray from its said end position, in the event that said carriage structure, following energization of said heating unit, is already in its operating position and said crumb collecting tray is fully inserted to its said end position, whereby said carriage structure moves back to said receiving position under spring action of said spring structure, thereby de-energizing said heating unit and aborting the toasting cycle.

4,986,174

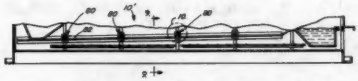
AUTOMATIC FOOD COOKING MACHINE

Dean Gongwer, Wakarusa, Ind., assignor to Nelgo Manufacturing, Inc., Wakarusa, Ind.

Continuation-in-part of Ser. No. 343,794, Apr. 27, 1989, Pat. No. 4,947,741. This application Jun. 11, 1990, Ser. No. 536,498

Int. Cl.[5] A47J *37/04*

U.S. Cl. 99—345 **4 Claims**



1. An automatic cooking machine having a frame, a housing supported on said frame, said housing having a pair of spaced side walls, an interconnecting top wall and bottom wall, and a pair of end walls, a heating means disposed in said housing for elevating the temperature therein to allow cooking of food products, carrying means disposed in said housing above said heating means for holding food products to be cooked by the heating means, conveyor means disposed in the housing for transporting the carrying means in a spaced relationship over said heating means, said housing having an access opening over said end wall at each end of the housing, a door means connected to said housing adjacent each said access opening for spanning the opening when in a closed position, said heating means includes a plate disposed below said conveyor means and a plurality of gas outlet ports disposed below said plate to radiate heat toward said plate, said plate protecting the outlet ports from drippings falling from said food products and means operatively associated with said plate for limiting disformation of said plate.

4,986,175

INK STAMP APPARATUS AND KIT

John R. Boehringer, Wynnewood, and John Aff, Schwenksville, both of Pa., assignors to Boehringer Laboratories, Norristown, Pa.

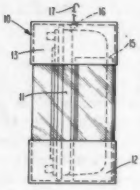
Filed Sep. 28, 1984, Ser. No. 655,512

Int. Cl.[5] B41K *1/02, 1/32*

U.S. Cl. 101—125 **6 Claims**

1. A stamp for inks and the like, comprising a base having a cavity in a face thereof; a pad for receiving ink or the like disposed in said cavity and protruding from said face a first predetermined amount; a handle extending outwardly from said base in the direction generally opposite to said face; resilient, integral standoff means having an upper end disposed against said base and protruding from said face a second prede-

termined amount greater than said first predetermined amount and being resiliently collapsible towards said face upon application of force to said handle; including therewith a generally cylindrical sleeve, with the stamp being generally snugly disposed in the sleeve against inner wall portions of the sleeve and comprising means whereby the pad is maintained out of contact with the inner wall of the sleeve; and wherein at least one stencil means is disposed within the sleeve.

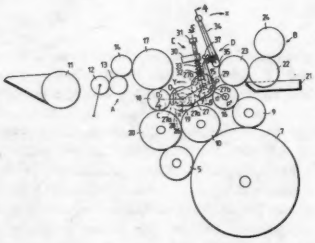


4,986,176

DEVICE FOR CONNECTING AND DISCONNECTING DAMPENING SYSTEM AND INKING SYSTEM IN OFFSET PRINTING MACHINE

Koji Ishii, and Naoki Ikeda, both of Fuchu, Japan, assignors to Ryobi Ltd., Hiroshima, Japan

Filed May 12, 1989, Ser. No. 350,889
Claims priority, application Japan, May 13, 1988, 63-117969
Int. Cl.[5] B41F *23/04, 23/16*
U.S. Cl. 101—148 **11 Claims**



1. A device for connecting and disconnecting a dampening system (B) and an inking system (A) in an offset printing machine, the offset printing machine including a plate cylinder (7), and the dampening system including a first roller train having a plurality of rollers and a dampening medium applicator roller (9) contactable with the plate cylinder, and the inking system including a second roller train having a plurality of rollers and at least one ink applicator roller (10) contactable with the plate cylinder, the device comprising:

a frame body having side walls (25, 25');

a pair of brackets (27,27') individually pivotally supported to said side walls and pivotally movable about a pivot axis (26,26');

a first intermediate roller (19) rotatably supported to the pair of brackets, the first intermediate roller being also slidable with respect to the brackets in a first direction (x), the first intermediate roller being biased towards a rest position whereat the ink applicator roller is in contact with the plate cylinder, and having a rotation axis (O) at the rest position, the first intermediate roller also being in rotational contact with a first stationary neighbouring roller (18) positioned immediately upstream thereof, said neighbouring roller belonging to the inking system and having a stationary rotation axis (O'), the first direction being oriented perpendicular to a line (c) extending between the rest position rotation axis and the stationary rotation axis;

a second intermediate roller (15) rotatably supported to the pair of brackets, the second intermediate roller also being slidable with respect to the brackets in a second direction (y), the second intermediate roller being biased towards a rest position whereat the ink applicator roller is in contact with the plate cylinder, and having a rotation axis (P) at the rest position, the second intermediate roller also being in rotational contact with a second stationary neighbouring roller (16) positioned immediately upstream thereof, said second neighbouring roller belonging to the dampening system and having a stationary rotation axis (P'), the second direction being oriented perpendicular to a line (d) extending between the rest position rotation axis (P) of the second intermediate roller and the stationary rotation axis (P') of the second neighbouring roller; and,

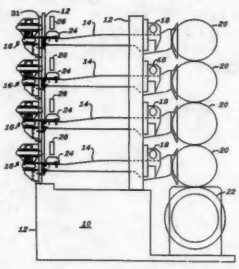
means (D) for pivoting the brackets about the rest rotation axis (O) of the first intermediate roller, the means for pivoting being connected to the brackets for moving the second intermediate roller toward and away from the neighbouring second stationary roller, such that the dampening system and the inking system may be selectively connected to each other or disconnected from each other.

4,986,177

APPARATUS FOR CONTROLLING THE LOAD/RELIEF PRESSURES IN A CALENDER

Jiri Masek, Montreal; Ralph J. Futcher, Beaconsfield, and James R. Dixon, Kirkland, all of Canada, assignors to Valmet-Dominion Inc., Lachine, Canada

Filed Oct. 20, 1989, Ser. No. 424,449
Claims priority, application Canada, Feb. 2, 1989, 589937
Int. Cl.[5] B30B *3/04*
U.S. Cl. 100—163 R **12 Claims**



10. A calender roll assembly comprising

frame means,

a plurality of lift arms each pivotally mounted relative to the main frame and each supporting a calender roll such that the plurality of lift arms collectively support a stack of calender rolls,

at least one calender stack pressure control apparatus mounted to the frame means each of which controls pressures associated with a corresponding calender roll in the calender stack, each said apparatus including:

bracket means connected to the frame means;

at least one first upper fluid pressure actuator means mounted to the bracket means to exert a corresponding first force output in a generally downward direction;

a pair of spaced apart and substantially horizontally aligned second fluid pressure actuator means respectively mounted to the bracket means below the first fluid pressure actuator means to exert respective second force outputs in a generally upward direction;

a force transfer means positioned between the first and second fluid pressure actuator means, the transfer means having an upper surface portion engagable with the first fluid pressure actuator means to translate the first force output into downward movement of the transfer means, the transfer means having an elongated lower surface portion having end portions engagable with the pair of spaced apart second fluid pressure actuator means and having a central portion bridging the second fluid pressure actuator means to translate the second force outputs into upward movement of the transfer means,

arm linking means connected to an end of a respective one of the lift arms to move the lift arm and control nip pressure to the calender roll, the arm linking means being positioned below the central portion of the transfer means between the spaced apart second fluid pressure actuator means; and,

means for releasably interconnecting the arm linking means with the transfer means to move the arm linking means in response to movement of the transfer means.

4,986,178

HOLDING ARRANGEMENT FOR A DEVICE DIRECTED AGAINST A LINEARLY ADJUSTABLE ROLL, SUCH AS A DOCTOR BLADE, BLOWING DEVICE OR SIMILAR

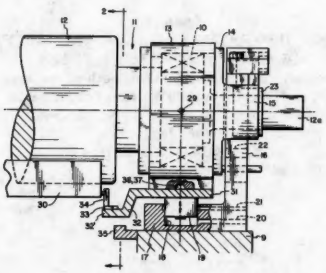
Paul Hafner, and Christian Schiel, both of Heidenheim, Fed. Rep. of Germany, assignors to J.M. Voith GmbH, Heidenheim, Fed. Rep. of Germany

Filed Apr. 25, 1989, Ser. No. 343,041

Claims priority, application Fed. Rep. of Germany, Apr. 30, 1988, 3814752

Int. Cl.[5] B30B *3/04*

U.S. Cl. 100—174 **22 Claims**



1. Apparatus comprising:

a machine frame;

a roll cylinder having a longitudinal axis and a pair of ends, each end mounted in said machine frame through a bearing housing;

a counter roll having a longitudinal axis and mounted in said machine frame axially parallel to said longitudinal axis of the roll cylinder, said roll cylinder and said counter roll being removable from the machine frame together with said bearing housings;

means for shifting said roll cylinder linearly transverse to the longitudinal axis thereof relative to said machine frame to press said roll cylinder onto said counter roll, said means including a cylinder/piston unit associated with each bearing housing, said cylinder/piston unit being arranged opposite said counter roll;

means directed against said roll cylinder for surface treatment of said roll cylinder; and

a holder plate arranged directly between the bearing housing and the cylinder/piston unit and connected with a support bearing for the means for surface treatment of said roll cylinder, said holder plate being situated so that said cylinder/piston unit acts directly against said holder plate when operable to press said roll cylinder onto said counter roll, said means directed against the roll cylinder and said holder plate being connected to said machine frame and remaining connected to said frame when said roll cylinder and said counter roll together with said bearing housings are removed from said machine frame.

4,986,179

PRINT HEAD FOR DOT MATRIX PRINTERS

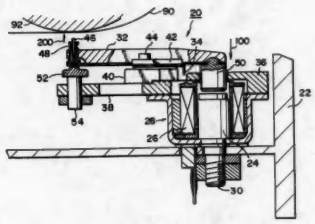
Takashi Moriya; Masahiko Ueda, and Toshihiro Endo, all of Tokyo, Japan, assignors to Citizen Watch Co., Ltd., Tokyo, Japan

Filed Jul. 20, 1989, Ser. No. 383,413

Claims priority, application Japan, Jul. 25, 1988, 63-185879

Int. Cl.[5] B41J *2/22, 9/38*

U.S. Cl. 101—93.04 **6 Claims**



1. In a print head for dot matrix printers comprising:

a head frame and

a plurality of stylus actuator units being arranged in parallel to each other and secured to said head frame;

each of said stylus actuator unit having;

an electromagnetic actuator fixed to said head frame and energized by an impact driving current,

a yoke base fixed to said stylus actuator unit,

an armature rockably supported to said yoke base while fixing a stylus for printing to one end thereof and having at the other end thereof a plunger attracted by said electromagnetic actuator,

whereby said stylus is impacted to recording paper by attracting said plunger when said impact driving current is supplied to said electromagnetic actuator:

the improvement comprising:

a support member supporting said armature at an intermediate position between the stylus fixing end and the plunger fixing end on said yoke base such that the direction in which said stylus is impacted is reversed to the direction in which said plunger is attracted;

said support member being composed of a torsion leaf spring having two side portions, a central portion, and an end portion with both side portions being coplanarly fixed to said yoke base and the central portion supporting said armature fixed thereto, said central portion having a torsion property in the direction of impact of said stylus with respect to the stationary side portions;

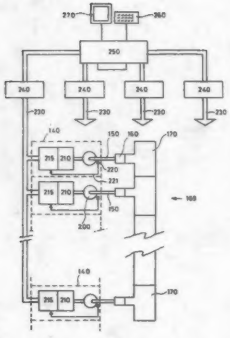
said torsion spring being provided at at least one part thereof with a bent portion which is bent in the direction substantially orthogonal to the plane in which said side portions are fixed so as to enhance the rigidity of said torsion spring and prevent said torsion spring from warping.

4,986,180

DEVICE FOR CONTROLLING THE OPENING OF AN INK FOUNTAIN OF A PRINTING MACHINE

Gilbert Mischler, Avenches, Switzerland, assignor to Bobst SA, Switzerland

Filed May 31, 1989, Ser. No. 359,167
Claims priority, application Switzerland, May 31, 1988, 02069/88
Int. Cl.[5] B41F *31/04, 31/06*
U.S. Cl. 101—365 6 Claims



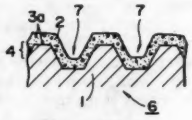
1. In a device for controlling the opening of an ink fountain of a printing machine, said ink fountain having the shape of a basin with a sloping bottom oriented towards an inking roller, said basin having a number of lamellae orthogonically movable towards a surface of the roller and arranged side by side on a common plane at a bottom wall of the basin to form a doctor blade, which coacts with the surface of the roller to define a gap for passage of the ink, the improvements comprising each lamella having a module, each module having a frame and a housing with the housing being mounted by the frame on a portion of the ink fountain, each module having a linear positioning means with an axle aligned with the lamella and connected to a rear edge of the lamella by an intermediate piece, detector means being disposed in each module for detecting a reference position of the axle and the movement of the axle with regard to the housing of the module, control means disposed in each of the modules for receiving electrical command signals and controlling linear positioning means to shift the lamella forward and backward with regard to the surface of the inking roller to a desire position, said control means receiving inputs of the detector means to compare the actual position to the desired position and creating an appropriate error signal to obtain the desired position for the lamella.

4,986,181

ROLLERS FOR A LITHOGRAPHIC INK SUPPLYING SYSTEM

Toshiro Kobayashi, Toyohashi; Hisashi Hiraishi, Tsuzuki; Makoto Hineno, Hirakata; Tomoshi Kawata, Yokohama; Yuuji Kohara, Kodaira, and Masaharu Saito, Hatano, all of Japan, assignors to Kubota Ltd., Osaka and Kabushikigaisha Tokyo Kikai Seisakusho, Tokyo, both of, Japan

Filed May 23, 1988, Ser. No. 197,575
Claims priority, application Japan, May 27, 1987, 62-130743
Int. Cl.[5] B41F *31/26*
U.S. Cl. 101—348 5 Claims



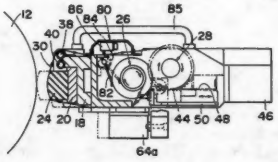
4. A roller for lithography comprising a roller coated with a surface layer comprising aluminum bronze casting finely and uniformly mixed in the ratio of 25–40% by weight with tungsten carbide-cobalt.

4,986,182

CLEANING APPARATUS AND CLEANING METHOD OF BLANKET OF PRINTING PRESS

Ikuo Sawaguchi, and Kiyonobu Omi, both of Saitama, Japan, assignors to Nikka Kabushiki Kaisha, Tokyo, Japan

Filed Nov. 25, 1988, Ser. No. 276,398
Claims priority, application Japan, Sep. 13, 1988, 63-229459
Int. Cl.[5] B41F *35/06;* B41L *41/06*
U.S. Cl. 101—483 6 Claims



5. A method of cleaning a blanket cylinder of a printing press having a press pad for pressing a cleaning cloth to a surface of said blanket cylinder, comprising the steps of:

subjecting a cleaning cloth to pass through a space between said press pad and said blanket cylinder from a supply roll to a take-up roller,

spraying a cleaning liquid to said cleaning cloth,

subjecting said press pad to move toward said blanket cylinder to thereby push said cleaning cloth onto a surface of said blanket cylinder,

moving slightly back said press pad from said blanket cylinder and winding up said cleaning cloth on said take-up roller, and

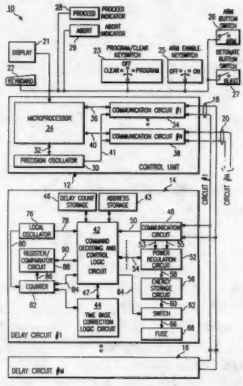
rewinding a part of said cleaning cloth to said supply roll for a re-use of the part of said cleaning cloth in the following cleaning step.

4,986,183

METHOD AND APPARATUS FOR CALIBRATION OF ELECTRONIC DELAY DETONATION CIRCUITS

Merritt Jacob, Allentown; Gerald L. Oswald, New Ringgold, and Glen P. Goffin, II, Newtown, all of Pa., assignors to Atlas Powder Company, Dallas, Tex.

Filed Oct. 24, 1989, Ser. No. 426,081
Int. Cl.[5] F42C *15/40*
U.S. Cl. 102—200 15 Claims



7. A method of operation for a blasting system having a control unit connected to a plurality of spaced apart delay ignition circuits, each having a unique address and a fuse for igniting an adjacent explosive, the method comprising the steps of:

storing in said control unit a table of addresses for said delay ignition circuits and a delay time for each delay ignition circuit,

transmitting a broadcast address and a negative verify command from said control unit concurrently to all of said delay ignition circuits,

monitoring by said control unit to detect a response from any one of said delay ignition circuits, and proceeding with the following steps if no response is received for said transmitted negative verify command within a preset time,

transmitting a calibration interval concurrently to all of said ignition delay circuits,

counting the output of a local oscillator in each of said delay ignition circuits to produce a calibration count in each said delay ignition circuit,

producing a corrected delay count for each of said delay ignition circuits as a function of said local oscillator count, a pre-determined delay time for each delay ignition circuit and a reference count,

transmitting a broadcast detonate command concurrently to each of said delay ignition circuits, and

upon receipt of said detonate command, each of said delay ignition circuits firing its fuse after a time delay corresponding to the corrected delay count for that delay ignition circuit.

4,986,184

SELF-STERILIZING FIRE-ON-THE-FLY BI-STABLE SAFE AND ARM DEVICE

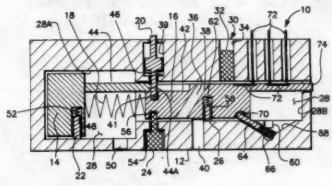
William B. Kude, Plymouth, Minn., assignor to Honeywell Inc., Minneapolis, Minn.

Filed Oct. 26, 1989, Ser. No. 426,923
Int. Cl.[5] F42C *15/24, 15/34*
U.S. Cl. 102—256 22 Claims

1. In combination with an energy transfer mechanism of an ammunition fuze having first, second and third elements being alignable in a firing relation, a safe and arm device for aligning said elements of said energy transfer mechanism, said device comprising:

(a) a housing having a bore and mounting said first and third elements of said energy transfer mechanism in spaced positions adjacent said bore;

(b) means disposed and movable within said housing bore for producing and storing an arming force in response to occurrence of a predetermined energy-generating event and for applying said force; and



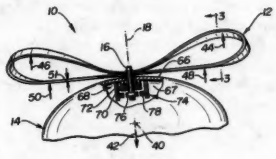
(c) a bi-stable interrupt barrier component mounting said third element of said energy transfer mechanism and being disposed within said housing bore and movable from a pre-armed stable safe position to a post-armed stable sterilized position in response to applying of said arming force and through an armed position located between said pre-armed and post-armed positions in which said first, second and third elements of said energy transfer mechanism are aligned in said firing relation with one another during a momentary period of time.

4,986,185

GRENADE DEVICE

William G. Kuhnle, Hopatcong, and James F. Murnane, II, Andover, both of N.J., assignors to The United States of America as represented by the Secretary of the Navy, Washington, D.C.

Filed May 8, 1989, Ser. No. 349,557
Int. Cl.[5] F42B *10/48, 12/58*
U.S. Cl. 102—388 4 Claims



1. A grenade device for ejection from an artillery projectile comprising:

a flexible stabilizing fabric propeller means capable of assuming variable shapes about a rotational axis; and a grenade body housing a charge connected to said propeller;

said propeller having two opposite blades which assume said variable shapes according to air speed and spin rate;

each blade having an upper tilted portion with a leading edge and a trailing edge and having a lower approximately flat portion with a leading edge and a trailing edge and having a bend return tip portion connecting to the upper tilted portion and connecting to the lower flat portion;

the upper tilted portion having a transverse angle of attack and having a longitudinal upper projected axis passing through the rotation axis; and

the lower flat portion having a longitudinal lower projected axis passing through the rotation axis with the longitudinal upper projected axis and the longitudinal lower projected

axis forming a projected displacement angle therebetween.

4,986,186

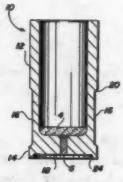
HIGH PEAK PRESSURE NOTCHED CARTRIDGE CASE

Edward W. LaRocca, Placentia, and Norman H. Andersson, Rancho Cucamonga, both of Calif., assignors to General Dynamics Corporation Air Defense Systems Division, Pomona Facility, Pomona, Calif.

Filed Nov. 1, 1988, Ser. No. 265,747

Int. Cl.[5] F42B *5/26*

U.S. Cl. 102—464 **5 Claims**



1. A cartridge case for use in conjunction with a firing chamber having an inner bore comprising:

a generally cylindrical shell having a hollow cylindrical portion open at a top end and joined to a closed base, said shell having a maximum outer diameter which fits said inner bore of said firing chamber, and a circumferential portion defining a structurally weakened segment with an inwardly displaced outer surface which overlaps both said base and said hollow cylindrical portion, said inwardly displaced outer surface forming a space surrounding the shell within said maximum diameter, said structurally weakened segment being deformable plastically into said space, said space being sufficient to allow outward plastic deformation of material of said structurally weakened segment without said outward deformation exceeding said maximum outer diameter when the cartridge is detonated;

said circumferential portion in the region of overlap with the hollow cylindrical portion having a uniform wall thickness that is less than the wall thickness of the remainder of said hollow cylindrical portion; and

said circumferential portion being bounded by upper and lower circumferential strips adjoining said circumferential portion and sloping from said maximum outer diameter to a smaller outer diameter of said circumferential portion.

4,986,187

TOY VEHICLE ASSEMBLY WITH VIDEO DISPLAY CAPABILITY

Roger Booth, Chester, and Thomas D. Heidt, Long Valley, both of N.J., assignors to Lionel Trains, Inc., Mt. Clemens, Mich.

Filed Dec. 27, 1988, Ser. No. 290,514

Int. Cl.[5] B60L *9/00*

U.S. Cl. 104—84 **22 Claims**

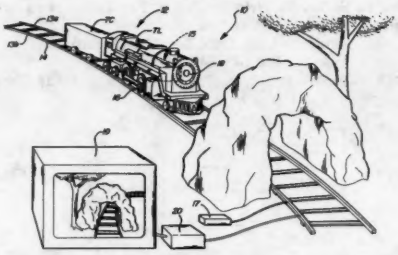
1. A toy vehicle assembly, comprising;

track means for receiving an electrical video signal and transmitting said electrical video signal,

a toy vehicle having wheel means on said track means for moving said vehicle along a path defined by said track means,

said vehicle including optical sensing means for sensing an optical image as said vehicle moves along said path and for producing the electrical video signal representative of said sensed image and transmitter means for supplying said electrical video signal to said track means, and

receiver means coupled to said track means for receiving said electrical video signal therefrom and producing a video output signal to be received by a monitor to visually reproduce the sensed image as said vehicle moves along



said track means for viewing by the user of said toy vehicle assembly.

4,986,188

PROTECTIVE CASING FOR MUNITIONS HAVING MEANS ENABLING IT TO BE BROKEN THROUGH

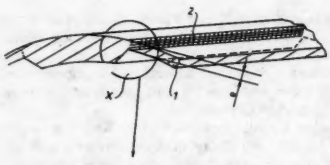
Jean-Francois Denis, Checy, and René Thouron, La Ferte Saint Aubin, both of France, assignors to Thomson-Brandt Armements, Boulogne Billancourt, France

Filed Aug. 29, 1989, Ser. No. 400,138

Claims priority, application France, Sep. 2, 1988, 88 11495

Int. Cl.[5] F42B *13/50*

U.S. Cl. 102—493 **7 Claims**



1. A protective casing for munitions, said casing being made of metal, for example light alloy, shaped by fusion and molding, designed to be broken through at the level of a fracture line wherein, in the zone where this fracture line should be located, there is interposed a screen of temperature-resistant fibers, the plane of which is perpendicular to the internal and external surfaces of the casing such that, during the casting of the metal in the mold, the metal links the fibers together to form a strip of composite fiber-metal material with a width forming a zone of embrittlement, the set formed by the casing and the said zone being obtained directly by means of fusion and molding operations.

4,986,189

MOBILE TRACK WORKING MACHINE

Josef Theurer, Vienna, and Josef Göllner, Marchtrenk, both of Austria, assignors to Franz Plasser Bahnbaumaschinen-Industriegesellschaft m.b.H., Vienna, Austria

Filed Nov. 1, 1989, Ser. No. 430,631

Claims priority, application Austria, Jan. 26, 1989, 156/89

Int. Cl.[5] E01B *27/16*

U.S. Cl. 104—12 **17 Claims**

1. A mobile machine for working on a track comprised of two rails fastened to ties, which comprises

(a) a machine frame,

(b) operating tools adjustably mounted on the machine frame,

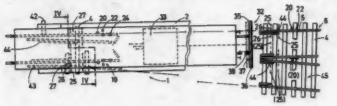
(c) drives for adjusting the operating tools into various operating positions and into an inoperative position with respect to the track rails,

(d) means on the machine frame for controlling the drives for adjusting the operating tools into the various operating positions and into the inoperative position, and

(e) an apparatus for automatically controlling the position of the operating tools, the apparatus including

(1) means for monitoring the transverse position of the track rails and obstacles along the track, and for generatering output signals indicating respective ones of the monitored transverse position of the track rails and of obstacles along the track, the monitoring means comprising a measuring beam extending transversely of the track and having a length corresponding at least to that of the ties and a plurality of sensors arranged adjacently along the length of the measuring beam for monitoring the transverse position of the track rails, and

(2) means for transmitting the output signals to the drive controlling means whereby the operating tools are adjusted into the respective position in response to the output signals.



4,986,190

VEHICLE, PARTICULARLY TRACK VEHICLE

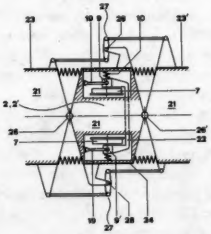
Gabor Harsy, Neuhausen, Switzerland, assignor to SIG Schweizerische Industrie-Gesellschaft, Switzerland

Continuation of Ser. No. 29,639, Mar. 24, 1987, abandoned. This application Mar. 23, 1989, Ser. No. 328,739

Claims priority, application Switzerland, Mar. 25, 1986, 1193/86

Int. Cl.[5] B61F *5/44*

U.S. Cl. 105—4.4 **9 Claims**



4. An articulated combination comprising:

at least a first track vehicle comprising a body with opposite sides, a roof in a roof region, and wheels arranged in pairs, with the wheels of each pair arranged at opposite sides of the body; a gantry-like frame comprising support members extending substantially upwardly from the wheels adjacent to the body sides and a cross member located extending between the support members in the roof region of the body; and a floor extending from one end of the vehicle to the other at a substantially constant level between and below the tops of the wheels;

wherein said wheels support said support members and are connected to said support members by pivotal means for allowing for limited steerability of the wheels; and

wherein the wheels of each said pair are interconnected by at least one link means which determines the spacing between said wheels and keeps said wheels substantially parallel;

said articulated combination further comprising an intermediate vehicle part coupled to said first vehicle, having a body and at least a pair of wheels arranged on opposite sides thereof; and

means for interconnecting the wheels of said intermediate vehicle part with the body of said first vehicle for steering said wheels of said vehicle part in response to changes in alignment between said first vehicle and said vehicle part.

4,986,191

RAILWAY VEHICLE WHOSE WEIGHT IS DISTRIBUTED ON FOUR AXLES WHICH ARE STEERABLE RELATIVE TO THE BODY

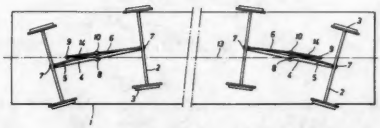
Jean-Pierre Ragueneau, Guerard; Rene Klima, Athis Mons, and Marie-Christine Piget, Paris, all of France, assignors to Regie Autonome Des Transports Parisiens, Paris Cedex, France

Continuation of Ser. No. 143,806, Jan. 14, 1988, abandoned. This application Sep. 18, 1989, Ser. No. 409,013

Claims priority, application France, Jan. 16, 1987, 87 00479

Int. Cl.[5] B61F *5/44*

U.S. Cl. 105—168 **4 Claims**



1. A railway vehicle comprising a body having a first set of two spaced apart axles and a second set of two spaced apart axles, each of said first set and said second set comprises: a horizontal link bar extending between said two spaced apart axles and pivotally fixed at its opposite ends to each of said axles at substantially the midpoint thereof, said horizontal link bar being pivotable about a first vertical axis defined by a member fixed to said body at a point midway between the midpoints of said axles; a first steering bar and a second steering bar, said first steering bar having one end secured orthogonally to one of said axles at substantially the midpoint thereof and the other end pivotably fixed to a second vertical axis fixed to said body at a point beyond the midway point between the midpoints of said axles and said second steering bar having one end secured orthogonally to the other of said axles at substantially the midpoint thereof and the other end pivotably mounted to said first steering bar at a point equidistant from said axles and means for directly applying the load of the body to each wheel axle in the vertical plane of each axle and at two points adjacent to the wheels connected to each axle.

4,986,192

RAILWAY TRUCK BOLSTER FRICTION ASSEMBLY

Donald Wiebe, Sewickley, Pa., assignor to A. Stucki Company Division of Hansen Inc., Pittsburgh, Pa.

Filed Apr. 11, 1989, Ser. No. 336,344

Int. Cl.[5] B61F *5/12*

U.S. Cl. 105—198.4 **10 Claims**

1. A railway truck assembly comprising:

a pair of elongated, laterally spaced side frames of a conventional structure;

each said side frame having a longitudinally extending transom opening therein with horizontally opposed ends and vertically extending side frame surfaces adjacent said horizontally opposed ends of said transom opening, and an

upwardly facing spring seat surface extending longitudinally of a lower portion of said transom opening intermediate said side frame surfaces;

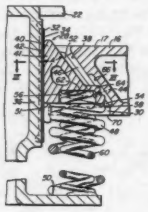
an elongated bolster extending between said side frames with opposed longitudinal end portions thereof being received within said transom openings, respectively;

said bolster having outwardly and downwardly open pockets extending inwardly from opposed external sides of each of said end portions;

each said pocket having an inner sloping surface which extends vertically in spaced, angled relation with respect to a respective one of said side frame surfaces;

shoe assemblies located in engagement with said side frame surfaces and with at least a given vertical extent of the respective said inner sloping surfaces for relative sliding movement thereon, respectively;

said bolster having elongated open recesses which extend inwardly of said inner sloping surfaces, respectively, and vertically thereof, with at least a portion of each said recess extending within said given vertical extent;



said shoe assemblies including rigid shoes with integral means which extend into said recesses, respectively;

said integral means being moveable within the confines of said recesses, respectively, including movement thereof within said portions of said recesses, to accommodate the normal range of relative sliding movement of said shoe assemblies on said inner sloping surfaces respectively;

each said rigid shoe having a spring receiving opening which extends upwardly therein and having an innermost end surface of said opening which is vertically spaced from said spring seat surface;

elongated coil spring means extending between said innermost end surfaces and said spring seat surface, respectively;

each of said coil spring means having adjacent coils thereof spaced apart to permit compression of said coil spring means to accommodate said relative sliding movement; and

load spring means extending between said end portions of said bolster and said spring seat surfaces, respectively, to support said bolster with respect to said side frames.

4,986,193

DESK TOP FOR STAND-UP AND WRITING DESK

Helmut Steinhilber, Sonnenbergstrasse 40, 6052 Hergiswil, Switzerland

Filed Oct. 19, 1989, Ser. No. 424,349

Claims priority, application Fed. Rep. of Germany, Oct. 19, 1988, 3835573

Int. Cl.[5] A47B *17/00*

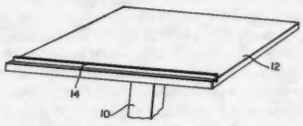
U.S. Cl. 108—27 **14 Claims**

1. A desk top for use while inclined comprising a lower edge facing the user and a top surface, and

means for preventing material from sliding off said top surface of said desk top comprising:

a strip extending above said top surface and along said lower edge, and

means for enabling only a lengthwise segment of said strip to be pushed downwardly upon engagement of the top thereof by the arm of a user and for resiliently urging said segment upwardly,



the portions of the strip not engaged by the user's arm extending above said inclined top surface to retain material thereon.

4,986,194

MULTI-ADJUSTABLE, MULTI-FUNCTIONAL, SPACE SAVING WORKPLACE SYSTEM

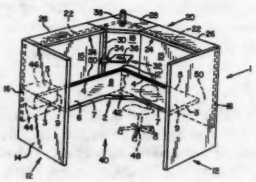
Clifford J. Boilman, 715 NE. 138th, Vancouver, Wash. 98664

Continuation of Ser. No. 935,250, Nov. 26, 1986, abandoned.

This application Jan. 30, 1989, Ser. No. 304,879

Int. Cl.[5] A47B *3/00*

U.S. Cl. 108—111 **23 Claims**



1. An adjustable, multi-functional, space-saving workplace system, which comprises:

a substantially horizontal table member having respective forward and rearward portions, and defining a work surface for conducting workplace operations in said forward portion, the plan configuration of said horizontal table member being substantially V-shaped;

a substantially horizontal covering member having respective forward and rearward portions, located above and disposed substantially parallel to the top horizontal surface of said table member;

means for supporting said respective table member and covering member in a substantially horizontal position with respect to the vertical axis of the workplace system,

means located within and across the length of said rearward portion of a top horizontal surface of said table member defining a first slot for receiving and interlockingly attaching in place therewithin at least one accessory means;

means located within and across the length of said rearward portion of the bottom horizontal surface of said cover member defining a second slot for receiving and interlockingly attaching in place therewith at least one accessory means;

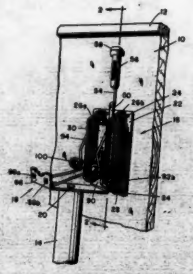
means defining an acoustically-controlled workplace compartment comprising the respective table and covering members together with the respective table and covering support members, said workplace compartment means providing a workplace which substantially surrounds a person working therewithin so as to effectively acoustically and aesthetically separate said person from the surrounding environment.

4,986,195

TILTING TABLE TOP MECHANISM

Niels Diffrient, Ridgefield, Conn., assignor to Howe Furniture Corporation, Trumbull, Conn.

Filed Sep. 28, 1988, Ser. No. 250,084
Int. Cl.[5] A47B 13/02
U.S. Cl. 108—150 11 Claims



1. A table top tilting mechanism for a table having a top with an underside and at least one leg having an upper end and a lower end which comprises:

a chassis member mountable on the underside of said table top having first and second coaxial spaced pivot support members thereon defining respective first and second aligned release openings therethrough parallel to their common axis;

a locking bolt carried by said chassis member operable between an extended locking position and a retracted unlocking position;

means for biasing said locking bolt into said locking position;

release handle means mountable on said table top for retracting said locking bolt to its unlocking position;

a base plate securable to the upper end of the table top, said base plate having a first end defining a locking hole engageable with said locking bolt and a second end carrying first and second spaced pivots; and

first and second pivot bearings rotatably mounted, respectively, in said first and second pivot support members, each of said bearings defining a slot for receiving a respective one of said first and second pivots, said slots being alignable with said release openings to permit said base plate to be attached to or detached from said chassis member.

4,986,196

SOLID WASTE INCINERATOR SYSTEM

Adam F. Butch, P.O. Box 916, Casselberry, Fla. 32707

Filed Aug. 13, 1990, Ser. No. 565,728
Int. Cl.[5] F23G 5/00, 5/12
U.S. Cl. 110—235 10 Claims

1. A solid waste incinerator system comprising:

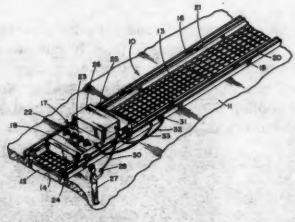
an elongated hearth having a plurality of walls and a floor and one elongated open side, said hearth having a grate mounted over the floor thereof whereby solid refuse can be dumped into said hearth from the open side for incineration thereof;

an elongated track positioned along said hearth opening side;

a burner car having a plurality of wheels riding in said elongated track for moving said burner car over said hearth, said burner car having a plurality of burners mounted thereon and having their flame directed into said hearth whereby said burners can incinerate said refuse in different positions along said elongated hearth;

a plurality of plenums connected through one side of said hearth beneath said grate for drawing heated gasses and burned ash therethrough, each said plenum forming a zone in said hearth for the removal of heated gasses and ash from said zone within said elongated hearth whereby said hearth forms a plurality of zones each fired by a single moving burner car;

a plurality of suction fans, one said fan located at end of each plenum for drawing said gasses and burned ash therethrough;



a plurality of cyclones, one said cyclone being mounted adjacent each said suction fan for removing ash from said gasses received from one said plenum; and

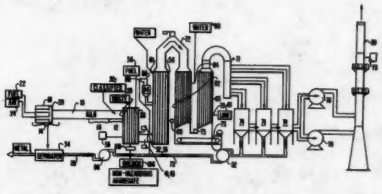
a plurality of afterburners, each afterburner being coupled to one said plenum for further burning of said gasses and ash.

4,986,197

APPARATUS FOR USING HAZARDOUS WASTE TO FORM NON HAZARDOUS AGGREGATE

John M. Kent, P.O. Box 1649, Slidell, La. 70459

Continuation-in-part of Ser. No. 362,352, Jun. 6, 1989, Pat. No. 4,922,841, which is a continuation of Ser. No. 244,017, Sep. 14, 1988, abandoned. This application May 8, 1990, Ser. No. 520,558
Int. Cl.[5] A47J 36/00, 36/24
U.S. Cl. 110—246 29 Claims



1. An apparatus for converting hazardous waste into non-hazardous, non-leaching aggregate, said apparatus comprising:

a rotary kiln having an entry portion;

oxidizing means adjacent the entry portion of said kiln, said oxidizing means comprising a water-cooled, metal-walled vessel;

a source of solid waste material, said solid waste material comprising large solid waste and waste fines;

means for separating said large solid waste from said waste fines;

means for introducing said large solid waste to said entry portion of said rotary kiln;

means for introducing said waste fines to said oxidizing means;

means for inducing combustion in said kiln to convert said large solid waste to solid particulate primary aggregate, clinker, volatile gases and gaseous combustion by-products;

means for separating said clinker from said solid particulate primary aggregate;

means for inducing combustion in said oxidizing means to

convert said waste fines, said volatile gases and said gaseous combustion by-products into noncombustible fines, molten slag, and waste gas;

means for passing said gaseous combustion by-products from said kiln and said waste gas from said oxidizing means;

means for cooling said noncombustible fines and said waste gas;

means for separating said noncombustible fines and said waste gas;

means for introducing said solid particulate primary aggregate and said noncombustible fines, to said molten slag to form a substantially molten mixture;

means for removing said mixture from said apparatus; and

means for cooling said substantially molten mixture to form said non-hazardous, non-leaching aggregate.

4,986,198

METHOD OF CONTROLLING COMBUSTION IN FLUIDIZED BED INCINERATOR

Takeyuki Naito; Yoshiki Kuroda, and Hiroshi Yoshida, all of Kanagawa, Japan, assignors to Ebara Corporation, Tokyo, Japan

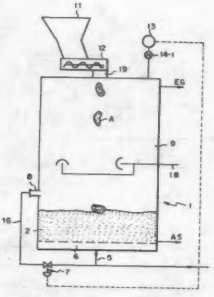
PCT No. PCT/JP88/00437, § 371 Date Jul. 28, 1989, § 102(e) Date Jul. 28, 1989, PCT Pub. No. WO88/08504, PCT Pub. Date Nov. 3, 1988

PCT Filed Apr. 30, 1988, Ser. No. 415,351

Claims priority, application Japan, May 1, 1987, 62-109552

Int. Cl.[5] F23G *3/00*

U.S. Cl. 110—346 **23 Claims**



1. A combustion control method for application in a fluidized bed incinerator for burning matter to be incinerated charged into a furnace by causing fluidization of a fluidizing medium with the assistance of air fed from a lower portion of a fluidized bed, comprising the steps of:

detecting the combustion rate of matter to be burnt in said furnace by a detecting means;

reducing the amount of air fed from the lower portion of said fluidized bed when said combustion rate exceeds a predetermined level; and

restoring the amount of air fed from said lower portion to its original value when said combustion rate decreases below said predetermined level so as to control and maintain said combustion rate of said matter to be burnt in said furnace at said predetermined level.

4,986,199

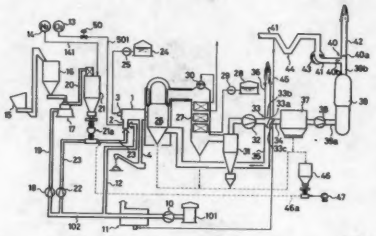
METHOD FOR RECOVERING WASTE GASES FROM COAL PARTIAL COMBUSTOR

Minoru Komeno, Yokohama; Motoaki Hirao, Tokyo; Toshiyuki Takeuchi, Yamato; Shunpei Nozoe, Urayasu; Hideki Takano, and Katsunori Yoshida, both of Chiba, all of Japan, assignors to Kawasaki Jukogyo Kabushiki Kaisha and Kawasaki Steel Corporation, both of Kobe, Japan

Filed Dec. 21, 1989, Ser. No. 454,288

Int. Cl.[5] F23D *1/06*

U.S. Cl. 110—347 **3 Claims**



1. A method of recovering high-temperature inflammable exhaust gases, comprising the steps of:

blending a mixture of pulverized coal and enriched air with oxygen as oxidizer gas, injecting the mixture together through a single tangential injection duct into a single, substantially horizontally arranged substantially cylindrical reaction chamber of a combustor apparatus, to develop a rapidly swirling vortex in the chamber;

igniting the mixture, while the same is rapidly swirling, to undergo partial combustion in the chamber over a short period of time to generate exhaust gases;

using the sensible heat of the generated exhaust gases in a heat exchange system or boiler; and

purifying the exhaust gases, after losing a portion of their sensible heat to the heat exchange system or boiler, with a filter and a desulfurization unit; and

recovering the purified gases.

4,986,200

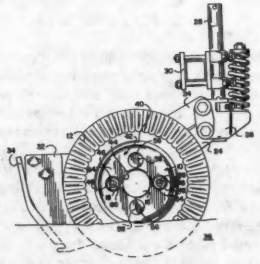
DEPTH GAUGE WHEEL

Mark Johnston, Macomb, Ill., assignor to Yetter Manufacturing Company, Colchester, Ill.

Filed Jul. 7, 1989, Ser. No. 377,242

Int. Cl.[5] A01C *23/02*

U.S. Cl. 111—135 **6 Claims**



1. A depth gauge wheel adapted to be positioned adjacent a coulter disc and adapted to be mounted on a rotatable hub to limit the depth to which the coulter disc can penetrate the

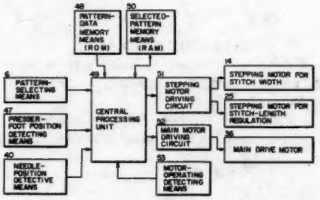
ground during operation, said depth gauge wheel including an upstanding concentric rim member having an inner edge surface and an outer edge surface, said rim member extending outwardly from the coulter disc when positioned adjacent thereto; a circular cover plate integrally formed with said rim member at said outer edge surface thereof; a first aperture defined through said depth gauge wheel centrally thereof to provide access to and to receive therein the hub for mounting of said depth gauge wheel on the hub; a plurality of sockets defined in said cover plate positioned radially outwardly of said first aperture, each of said sockets including a bottom wall positioned between said inner and outer edge surfaces of said rim member and at least one second aperture passing through said bottom wall of one of said sockets, a sleeve extending between said bottom wall of at least one of said sockets and said inner edge surface of said rim member, whereby said first aperture provides a recess for insertion of the hub and said second aperture provides a passage through which lugs extending from the hub may pass and each said sleeve is positioned to receive a lug extending from the hub and said bottom wall of said sockets provide a bearing surface for securement of fasteners over the lugs to thereby secure said depth gauge wheel adjacent the coulter disc.

4,986,201

SEWING MACHINE CAPABLE OF SETTING A FABRIC FEED TO ZERO AT THE BEGINNING OF SEWING OPERATION

Toru Hyodo, and Akiyoshi Sasano, both of Tokyo, Japan, assignors to Janome Sewing Machine Company Limited, Tokyo, Japan

Filed Aug. 28, 1989, Ser. No. 399,705
Claims priority, application Japan, Aug. 26, 1988, 63-210516
Int. Cl.[5] D05B *3/02*
U.S. Cl. 112—456 **3 Claims**



1. A sewing machine of the kind having a machine drive motor driven to rotate a drive shaft to reciprocate vertically a machine needle between an upper position and a lower position, the needle being swingable laterally of a fabric feeding direction, a fabric feeding mechanism including a feed dog, first means for moving the feed dog between a lower position under a throat plate and an upper position above the throat plate, second means for moving the feed dog in the fabric feeding direction when the feed dog is located above the throat plate, a feed regulator operatively connected to the second means, an actuator operatively connected to the feed regulator and arranged to displace the feed regulator angularly to adjust the moving amount of the feed dog in the fabric feeding direction, and a presser foot arranged to be manually operated between an upper position at which the presser foot is spaced from the throat plate and a lower position at which the presser foot is pressed against the throat plate and which cooperates with the feed dog to transport the fabric placed therebetween in the fabric feeding direction with respect to the machine needle, and memory means having pattern data stored therein including specific feed adjusting data, said sewing machine comprising:

first detecting means for detecting if said machine drive motor is driven or stopped;

second detecting means for detecting if said machine needle is located at its upper position or its lower position;

third detecting means for detecting if said presser foot is located at its upper position or its lower position; and

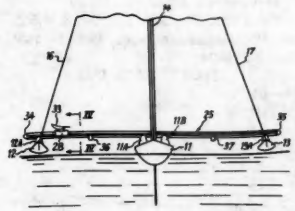
control means operative in response to a condition wherein said first detecting means detects that the machine drive motor is stopped, said second detecting means detects that said machine needle is at its upper position and said third detecting means detects that said presser foot is at its upper position, including means for reading out said specific feed adjusting data from said memory means to drive said actuator, and for angularly displacing said feed regulator to a specific position at which the moving amount of said feed dog is reduced to zero.

4,986,202

LIGHT DROPKEEL BOAT WITH SLIDING MEANS TO CONTROL THE TRANSVERSE BALANCE THEREOF

Pascal Mourgue, and Patrice Hardy, both of Paris, France, assignors to Cartier International B.V., Amsterdam, Netherlands

Continuation of Ser. No. 93,652, Sep. 8, 1987, abandoned. This application Aug. 7, 1989, Ser. No. 393,844
Claims priority, application France, Sep. 8, 1986, 86 12543
Int. Cl.[5] B63B *39/02*
U.S. Cl. 114—39.1 **16 Claims**



1. A light sailboat in which a seat for a crew member can be freely laterally displaced relative to the boat for balancing the same against the action of the wind, said sailboat comprising:

a slide beam fixed transversely across the sailboat and extending continuously from at least one outer side of the sailboat to the other outer side,

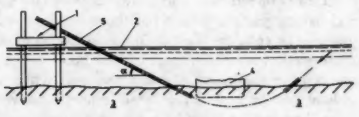
a carriage movably mounted on said slide beam for movement from one end of said slide beam to the other end and a seat pivotally mounted about a generally vertical axis on said carriage.

4,986,203

METHOD FOR RAISING ANY OBJECT LYING ON THE BOTTOM OF THE SEA, A RIVER OR BASIN, AND APPARATUS USED THEREBY

Alain Bernard, Heistraat, and Marc Stordiau, Antwerp, both of Belgium, assignors to Hydro Soil Services, Deurne, Belgium

Filed Nov. 13, 1989, Ser. No. 435,778
Claims priority, application Belgium, Dec. 17, 1986, 217549
Int. Cl.[5] B63C *7/08*
U.S. Cl. 114—51 **6 Claims**



1. Method for raising a sunken ship, and generally any object

lying on the bottom of the sea, a river or a basin, comprising arranging a lifting platform adjacent the object to be raised, from said lifting platform supporting tubes are arranged in relation to the sea bottom at an angle from 10° to 90° to lay a connection between the lifting platform and the bottom, and inserting boring rods through said supporting tubes, whereby use is made of a means for boring connected to said boring rods which does not require rotating the boring rods proper and said boring means is bent at such an angle that said boring rods connected thereto are moved along a curve underneath the object to be raised, continuing boring until said boring means, with the boring rods connected thereto projects far enough out of the bottom, and finally use is made of the obtained bore to lead a cable from one side to another side of said object, wherein said boring means comprises a boring motor having a boring crown which revolves inside said boring rods due to a boring liquid being pumped through said boring rods, and wherein said boring crown is uncoupled and replaced by a sleeve and hook for a hoisting cable, said boring rods and boring motor with said hoisting cable are pulled back so that said cable remains inside said bore.

4,986,204

OSCILLATIONLESS SEMISUBMERGED HIGH-SPEED VESSEL

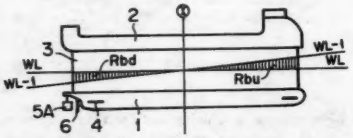
Toshio Yoshida, 2-23, Rikyumae-Machi 1-Chome, Suma-Ku, Kobe-Shi, Hyogo-Ken, Japan

Filed Oct. 19, 1989, Ser. No. 424,368

Claims priority, application Japan, Oct. 20, 1988, 63-262730; Aug. 23, 1989, 1-214874

Int. Cl.[5] B63B *1/12*

U.S. Cl. 114—61 **6 Claims**



1. An oscillationless semisubmerged high speed vessel, comprising:

at least one lower hull for being submerged below a water surface in the cruising state of the vessel, said lower hull having horizontal fins provided at least at the fore and aft parts thereof for controlling longitudinal and transverse oscillations of the vessel, steering means, water ballast tank means for adjusting the depth to which the vessel will sink into the water, and propelling means;

strut means fixed to said lower hull and extending upward therefrom past the position of the water surface on said strut means and having a sufficiently small water plane area and therefore a small reserve buoyancy such that the vessel does not have a self-stabilizing ability both longitudinally or transversely thereof;

an upper hull fixedly supported on the upper end of said strut means; and

said strut means having at least a midship strut having sufficient for connection of said lower hull and said upper hull and having parts at which the shape changes and which generate large wave heaving forces, said strut means being positioned at a midship part of said hulls which extends one third of the length of said lower hull, whereby longitudinal oscillations of the vessel due to changes of the wave heaving forces which are vertical components of wave exciting forces generated at the fore and aft parts of said vessel are minimized.

4,986,205

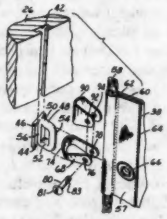
SELF-FLAKING SAIL SYSTEM

John E. Somers, 35776 Koenig, New Baltimore, Mich. 48047

Filed Jul. 6, 1989, Ser. No. 376,316

Int. Cl.[5] B63H *9/06*

U.S. Cl. 114—104 **13 Claims**



1. A system for causing controlled flaking of a sail as it is lowered comprising, in combination:

a sail track for arrangement in a generally vertical plane;

a sail having a luff for attachment to said track; and

a series of pairs of looped-together sail slides and sail shackles to connect the sail luff at spaced-apart points therealong to said track for sliding movement along the track and rotation between positions either parallel or perpendicular to the track;

said sail slides and sail shackles having rotation limiting portions at each of said spaced points arranged to prevent rotation in first one direction and then the other at said successive spaced points, whereby on lowering the sail, the luff is caused to flake first one way and then the other along the track.

4,986,206

BILGE DRAIN VALVE

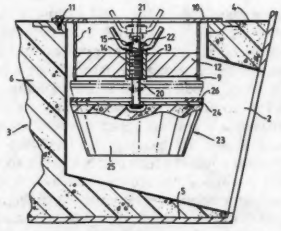
Dereck I. Knight, and Dennis A. Rule, both of Bournemouth, England, assignors to The Secretary of State for Defense, London, England

Filed May 31, 1989, Ser. No. 358,803

Claims priority, application United Kingdom, Dec. 19, 1986, 8630454

Int. Cl.[5] B63B *13/00*

U.S. Cl. 114—183 R **5 Claims**



1. A bilge drain valve for an elevated bilge vessel having a drain port communicating downwardly from the bilge to the exterior of the vessel comprising:

an open ended drain cylinder (1) locatable within the drain port (2) having an upper end attachable to the bilge so as to depend vertically therefrom;

a support member (12) attached diametrically within the drain cylinder and having a spindle bearing (14) disposed axially therein; and

a buoyant closure member (23) having an upwardly extend-

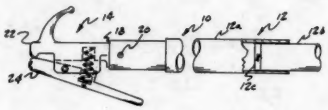
ing axial spindle (2)) slideably engaged in the spindle bearing (14) and having an upper face engageable with the lower end of the drain cylinder, the buoyant closure member (23) including a means defining a buoyancy sufficient to counterbalance its own weight and the weight of a volume of water containable in the drain cylinder (1).

4,986,207

BOAT HOOK DEVICE

Allan R. Reed, St. Clair Shores, Mich., assignor to Reed Nauticals, Inc., St. Clair Shores, Mich.

Filed Mar. 30, 1990, Ser. No. 502,301
Int. Cl.[5] B63B 9/00
U.S. Cl. 114—221 R 10 Claims



1. A holder for a conventional snap-hook, the conventional snap-hook having generally axially aligned hook and eyelet components arranged generally on a common plane, the conventional snap-hook further having a spring biased snap component, said holder comprising:

a biasing member, said biasing member having a forward end and an opposite handle end;

a seating member having a first end and a second end;

an elongate handle connected with said second end of said seating member;

pivoting means for pivotally attaching said biasing member to said seating member;

biasing means for biasing said forward end of said biasing member toward said seating member, movement of said handle end of said biasing member permitting said forward end of said biasing member to be pivoted away from said seating member; and

a snap-hook seat integral with said first end of said seating member, said snap-hook seat being structured to snugly receive a pre-selected portion of the conventional snap-hook, said snap-hook seat being further structured so as not to interfere with operation of the hook, eyelet and spring biased snap components of the conventional snap-hook when the conventional snap-hook is seated in said snap-hook holder; said forward end of said biasing member applying a biasing force toward said snap-hook seat for selectively retaining the conventional snap-hook in said snap-hook seat, said handle end of said biasing member permitting said forward end of said biasing member to be pivoted away from said snap-hook seat sufficiently to allow seating of the conventional snap-hook into said snap-hook seat;

wherein the conventional snap-hook may be selectively connected to an object and the conventional snap hook may then be removed from said snap-hook seat by pulling said second end of said seating member away from the object.

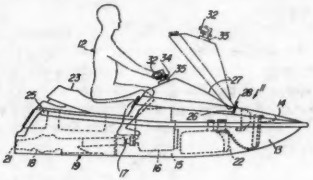
4,986,208

ENGINE COVER CONSTRUCTION OF SMALL BOAT

Noboru Kobayashi, Kosai, Japan, assignor to Yamaha Hatsudoki Kabushiki Kaisha, Iwata, Japan

Filed Nov. 25, 1986, Ser. No. 934,727
Claims priority, application Japan, Nov. 26, 1985, 60-265885
Int. Cl.[5] B63B 35/86
U.S. Cl. 114—270 10 Claims

1. In a small watercraft having a hull defining a rider's area, steering means carried by said hull for steering said hull in the water, an opening formed in said hull forwardly of said rider's area, a hatch cover for removably closing said opening, said hatch cover being formed from a lightweight thin material, a steering column, a reinforcing member affixed to said hatch



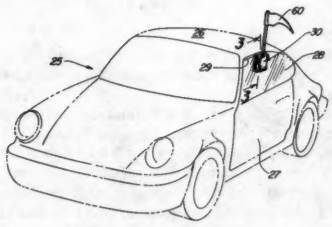
cover and journaling said steering column, and means coupling said steering column to said steering means for steering said watercraft.

4,986,209

PORTABLE DISPLAY MEANS

Joseph P. Spica, Livonia, Mich., assignor to The 2500 Corporation, Birmingham, Mich.

Continuation-in-part of Ser. No. 207,739, Jun. 16, 1988, abandoned. This application Feb. 12, 1990, Ser. No. 479,219
Int. Cl.[5] B60Q 1/32
U.S. Cl. 116—28 R 38 Claims



1. An emergency distress signal including:

(a) a substantially s-shaped channel member having,

(i) a first separate side wall,

(ii) a separate common wall,

(iii) a bottom wall connecting said first separate side wall and said separate common wall,

(iv) a second separate side wall; and

(v) a top wall connecting said second separate side wall and said separate common wall,

(b) rod locator means formed partially from said s-shaped channel member,

(c) a rod means removably mounted to said s-shaped channel member in cooperation with said rod locator means; and,

(d) an emergency distress flag attached to said rod means.

4,986,210

APPARATUS FOR COATING PIPE THREADS

Thomas E. Hollstein, Amherst, Ohio; Larry W. Keefer, Wichita, Kans.; Terrence M. Fulkerson, Parma, Ohio, and Kenneth W. Gray, Odessa, Tex., assignors to Nordson Corporation, Westlake, Ohio

Filed Oct. 14, 1988, Ser. No. 258,151
Int. Cl.[5] B05C 1/02
U.S. Cl. 118—629 11 Claims

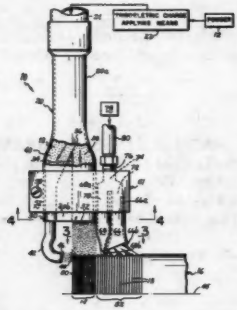
1. Apparatus for coating the endmost threaded portion of a pipe with solid particulate powder material, which apparatus comprises

means for rotating a pipe about a longitudinal axis of said pipe, said pipe having a threaded end portion,

means including a conduit for supplying a stream of air-entrained powder to a spray nozzle, said spray nozzle

having a discharge orifice, said nozzle being operative to direct said air-entrained powder from said discharge orifice of said nozzle onto a first threaded end portion of said rotating pipe,

means for directing a stream of gas onto a second portion of said pipe, said second portion of said pipe being located immediately adjacent to said first threaded end portion, said stream of gas being operative as a mask to prevent air-entrained powder from contacting said second portion of said pipe so as to obtain a sharp line of demarcation



between the powder coated first threaded end portion of said pipe and the uncoated second portion of said pipe, and

means for dividing said stream of air-entrained powder into two streams of air-entrained powder before said powder is directed from said discharge orifice of said nozzle, one of said streams of air-entrained powder being directed onto an endmost thread of said pipe and the other of said streams of air-entrained powder being directed onto said threaded portion at an angle generally perpendicular to the threads of said threaded portion.

4,986,211

TONING METHOD AND MEMBER FOR ELECTROSTATOGRAPHY

Joseph R. Coulter, Jr., Miami Springs, Fla., and Josef Matkan, Malvern, Australia, assignors to Coulter Systems Corporation, Bedford, Mass.

Filed Sep. 7, 1989, Ser. No. 404,170
Int. Cl.[5] B05B *5/025*
U.S. Cl. 118—644 20 Claims

1. A toning method for electrostatography wherein a recording member containing information on its image bearing surface in the form of electrostatic latent images of one polarity is toned by attracting to such latent images toner material of opposite polarity, comprising the steps of:

providing a carrier member having on at least one surface thereof a dry pre-toner coating;

activating said pre-toner coating with an insulative solvent to thereby solvate and confer opposite polarity to said pre-toner coating while rendering said pre-toner coating releasable from said carrier member;

establishing virtual contact between said activated and releasable pre-toner coating on said carrier member and the image bearing surface of said recording member;

transferring said pre-toner coating in image configuration onto said recording member by attraction to said latent images to form toner deposits thereon; and

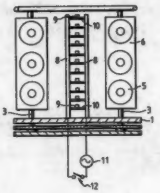
separating said carrier member from said recording member.

4,986,212

METALLIZING APPARATUS

Kazuhiro Shibamoto, and Tsutomu Yaekura, both of c/o Pioneer Video Corporation, No. 2680, Nishi Hanawa, Tatomi-cho, Nakakoma-gun, Yamanashi, Japan

Filed Apr. 26, 1990, Ser. No. 515,016
Claims priority, application Japan, Oct. 11, 1989, 1-118931[U]
Int. Cl.[5] C23C *14/26*
U.S. Cl. 118—715 5 Claims



1. In a metallizing apparatus of the type in which filaments are arranged with their end portions secured to electrodes by a securing means and metal on said filaments is heated by passing electrical current through said filaments to metallize a workpiece by vacuum deposition; each said securing means characterized by;

a supporting member secured to an electrode, said supporting member having a recess therein facing said electrode, and a threaded through-hole extending through said supporting member with one end thereof communicating with said recess;

an interposed member slidably fitting within said recess and having a fitting groove which is shaped to receive an end portion of a said filament to urge said filament into engagement with said electrode when said interposed member is pressed in a direction toward said electrode; and

a depressing bolt threadably extending through said through-hole and pressing said interposed member in a direction toward said electrode.

4,986,213

SEMICONDUCTOR MANUFACTURING DEVICE

Shunpei Yamazaki, Tokyo; Kunio Suzuki, Atsugi; Susumu Nagayama, Tokyo; Takashi Inujima, Atsugi; Masayoshi Abe, Tokyo; Takeshi Fukada, Ebina; Mikio Kinka, Atsugi; Ippei Kobayashi, Atsugi; Katsuhiko Shibata, Atsugi; Masato Susukida, Atsugi, and Kaoru Koyanagi, Saku, all of Japan, assignors to Semiconductor Energy Laboratory Co., Ltd., Kanagawa, Japan

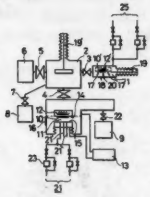
Continuation of Ser. No. 891,791, Aug. 1, 1986, abandoned. This application Sep. 28, 1988, Ser. No. 251,940
Claims priority, application Japan, Aug. 2, 1985, 60-170956; Aug. 23, 1985, 60-186372
Int. Cl.[5] C23C *16/48, 16/50*
U.S. Cl. 118—719 5 Claims

1. A semiconductor manufacturing apparatus comprising:

a film forming chamber including means for depositing semiconductor film on a substrate;

a first separate chamber provided with a lamp capable of photo annealing said semiconductor film whereby the substrate may be transported without making contact with air to the inside of said first separate chamber so that said lamp can effect said photo annealing of the films in the absence of air in a vacuum of less than 10^{-3} Torr;

a cryosorption pump capable of establishing said vacuum in the first separate chamber; and



means capable of neutralizing dangling bonds in the photo annealed semiconductor film with a gaseous neutralizer.

4,986,214

THIN FILM FORMING APPARATUS

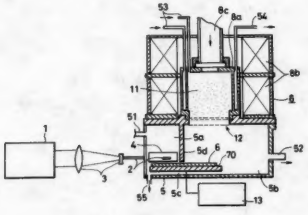
Nobuyuki Zumoto; Toru Takahama; Susumu Hoshinouchi, and Noriko Morita, all of Hyogo, Japan, assignors to Mitsubishi Denki Kabushiki Kaisha, Tokyo, Japan

Filed Dec. 16, 1987, Ser. No. 133,837

Claims priority, application Japan, Dec. 16, 1986, 61-300379; Jun. 16, 1987, 62-147877

Int. Cl.[5] C23C *16/48*

U.S. Cl. 118—722 **2 Claims**



1. A thin forming apparatus, comprising:

a reaction chamber for receiving therein a substrate and a thin film forming gas;

an ultraviolet laser beam oscillator for generating an ultraviolet laser beam which passes in parallel with said substrate along a path spaced apart therefrom for causing dissociation of said thin film forming gas to thereby form a thin film over the surface of said substrate;

and a plasma generator for generating ions for controlling growth of a thin film, wherein said reaction chamber comprises:

a first chamber for receiving therein a thin film forming gas, said first chamber receiving said laser beam from said laser beam oscillator;

a communication passage portion communicated with said first chamber;

a second chamber communicated with said communication passage portion, said second chamber receiving said ions generated in said plasma generator;

a suceptor disposed in said communication passage portion for supporting said substrate thereon; and

a driving means for alternately moving said suceptor between said first and second chambers.

4,986,215

SUSCEPTOR FOR VAPOR-PHASE GROWTH SYSTEM

Takayuki Yamada, and Takeshi Kii, both of Saga, Japan, assignors to Kyushu Electronic Metal Co., Ltd., Saga and Osaka Titanium Co., Ltd., Hyogo, both of, Japan

Filed Sep. 1, 1989, Ser. No. 401,101

Claims priority, application Japan, Sep. 1, 1988, 63-219277

Int. Cl.[5] C23C *16/00*

U.S. Cl. 118—728 **4 Claims**

1. A susceptor for a vertical vapor-phase growth system designed to heat substrates by means of heat transferred and radiated from a susceptor heated to cause vapor-phase growth on said substrates, said susceptor comprising:

a spot-faced portion provided therein for mounting a substrate, said spot-faced portion having a concentrical circular ridge to define a pair of inner and outer spaces at the inner and outer sides, respectively, of said ridge, each of said inner and outer spaces having a concave bottom having a circular radial section, so that a substrate is supported by said circular ridge.

4,986,216

SEMICONDUCTOR MANUFACTURING APPARATUS

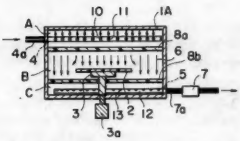
Toshiaki Ohmori, and Takaaki Fukumoto, both of Itami, Japan, assignors to Mitsubishi Denki Kabushiki Kaisha, Japan

Filed Jul. 31, 1989, Ser. No. 387,062

Claims priority, application Japan, May 10, 1989, 1-115160

Int. Cl.[5] C23C *16/00*

U.S. Cl. 118—730 **19 Claims**



1. A semiconductor manufacturing apparatus comprising:

a chamber;

means for supporting a semiconductor substrate within said chamber;

gas supply means disposed in said chamber opposite a substrate supported by said means for supporting for supplying a gas into said chamber;

first rectifying means disposed between said gas supply means and the substrate dividing said chamber for making the flow rate and the direction of the gas supplied to the substrate from said gas supply means constant;

discharge means disposed on the opposite side of the substrate from said first rectifying means for discharging the gas from said chamber; and

second rectifying means disposed between said gas discharge means and the substrate dividing said chamber for making the flow rate and the direction of the gas flow away from the substrate constant wherein at least one of said first and second rectifying means comprises a polymeric filter having pores ranging in size from 0.01 μm to 100 μm.

13. A semiconductor manufacturing apparatus comprising:

a chamber;

means for supporting a semiconductor substrate within said chamber;

gas supply means disposed in said chamber opposite a substrate supported by said means for supporting for supplying a gas into said chamber;

first rectifying means disposed between said gas supply means and the substrate dividing said chamber for making the flow rate and the direction of the gas supplied to the substrate from said gas supply means constant;

discharge means disposed on the opposite side of the substrate from said first rectifying means for discharging the gas from said chamber; and

second rectifying means disposed between said gas discharge means and the substrate dividing said chamber for making the flow rate and the direction of the gas flow away from the substrate constant wherein at least one of said gas supply means and said discharge means includes a spiral tube containing a plurality of holes along the tube for the passage of a gas.

4,986,217

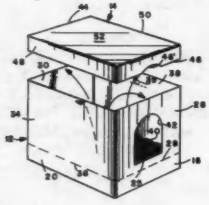
DISPOSABLE CAT LITTER BOX

Robert Robinson, and Ernest O. Hartman, both of Chicago, Ill., assignors to Robinson Hartman, Chicago, Ill.

Filed Sep. 15, 1989, Ser. No. 407,934

Int. Cl.[5] A01K *29/00*

U.S. Cl. 119—168 **24 Claims**



1. A disposable cat litter box comprising a bottom portion for carrying litter material including a relatively rigid lower portion having a bottom wall, a pair of upstanding side walls and a pair of upstanding end walls; and a foldable upper portion including a flap portion foldable between collapsed and extended positions attached to each of said side walls and end walls; and a removable, relatively rigid lid dimensioned to fit on said bottom portion with said flap portions in either said collapsed or extended portions, wherein, in the extended position, vertical edges of each flap portion lie substantially perpendicular to vertical edges of adjacent flap portions, and further wherein each pair of adjacent edges are created from a single cut in said upper portion such that, in use, a friction lock is established between said adjacent edges when said foldable flap portions are raised to said extended position.

4,986,218

CANINE LAVATORY

Rudolph Cassone, 292 Bay 11th St., Brooklyn, N.Y. 11228

Filed Oct. 16, 1989, Ser. No. 421,665

Int. Cl.[5] A01K *29/00*

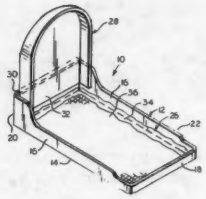
U.S. Cl. 119—169 **3 Claims**

1. A canine lavatory comprising:

(a) a box-like base member having a bottom wall, a pair of side walls, a front wall, a rear wall and an open top, being of a size to receive a dog thereon;

(b) a urine deflector comprising a panel with a flange outstanding from a periphery thereof together providing a continuous, generally concave imperforate, inner urine catchment surface;

(c) means releasably to attach the urine deflector to a rearward wall part of the box-like base member with the panel extending vertically and the flange forwardly and lowermost edge portions of the deflector panel and flanges within the box-like base portion adjacent and in overlapping relation to the rear and side walls, respectively, so that if the dog is male and urinates, said deflector will direct the urine towards said excrement catching means so



that the urine can be collected and removed from said base member for disposal; and,

(d) means placed within said base member for catching excrement from the dog so that the excrement can be collected and removed from said base member for disposal.

4,986,219

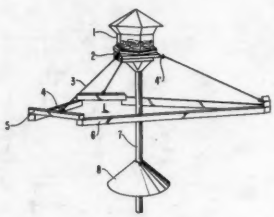
DYNAMIC ACTION BIRD FEEDER

Norman D. Harris, R.D. #4, Straw Rd., Hopkinton, N.H. 03229

Continuation of Ser. No. 223,914, Jul. 25, 1988, abandoned. This application Apr. 20, 1990, Ser. No. 511,451

Int. Cl.[5] A01K *39/014*

U.S. Cl. 119—57.8 **6 Claims**



1. A dynamic action bird-feeder having, in combination, a loop formed of bird-feed container channels suspended in horizontal plane balance from a vertical mast-supported internal central hub by a plurality of flexible but taught resilient wire-like suspension elements connected between circumferentially spaced points of the loop and corresponding spaced circumferential points along the hub at acute angles with the loop and the mast, the loop being thus suspended to be resiliently tiltable and swingable in a bouncing spring-like fashion out of balance from the horizontal plane in response to unbalancing forces exerted on points of the loop by birds contacting said points of the feed channels.

4,986,220

GAME FEEDER AND IMPROVED DISTRIBUTOR

Charles F. Reneau, 2124 Marnel, Houston, Tex. 77055, and E. Ray Brumley, Rte. 3, Box 283, Huntsville, Tex. 77340

Filed Apr. 10, 1990, Ser. No. 506,942

Int. Cl.[5] A01K *39/01*

U.S. Cl. 119—57.91 **15 Claims**

1. A game feeder comprising

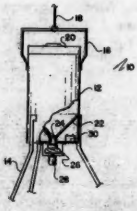
a feed container having an outlet; and

a distributor including

inlet structure providing an inlet opening in feed receiving relation with the container outlet;

outlet structure providing at least one laterally facing outlet opening in feed receiving relation with the distributor inlet opening;

a motor having a rotary output shaft connected to the distributor for spinning the distributor about a first upright axis and centrifugally broadcasting feed around the feeder; and



a gate and means mounting the gate on the distributor for free swinging rotary movement about a second axis transverse to the first axis between a normally closed first position obstructing the distributor outlet opening in a stopped condition of the motor to a second open position allowing feed movement through the distributor outlet opening in response to spinning movement of the distributor.

4,986,221

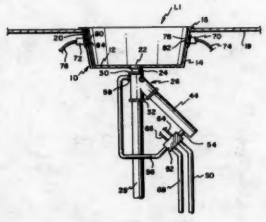
LIVESTOCK WATERER AND METHOD

Daniel C. Shaw, 520 Old Mins Rd., Geneva, Fla. 32732

Filed Oct. 21, 1988, Ser. No. 261,234

Int. Cl.[5] A01K *7/06*

U.S. Cl. 119—73 **20 Claims**



1. An animal waterer, comprising:

(a) a bowl having an open top and a bottom drain;

(b) first valve means operatively associated with said drain for selectively blocking and unblocking said drain;

(c) water supply means cooperating with said bowl and operatively associated with said first valve means for supplying water to said bowl when said first valve means blocks said drain so that said bowl thereby fills with water, and for preventing water from flowing to said bowl when said first valve means does not block said drain;

(d) second valve means interposed between said first valve means and said water supply means and operably associated with said first valve means; and

(e) non-contact sensing means operatively associated with said bowl, said water supply means and said first and second valve means for causing said first valve means to block said drain when the presence of an animal is sensed so that said bowl is thereby filled with water for the animal to drink, and for causing said first valve means to unblock said drain and said second valve means to block said water supply means to prevent water from flowing to said bowl when no animal is sensed so that said bowl is drained of water; said second valve means being operably associated with said sensing means for causing water to flow to said first valve means when the presence of an animal is sensed, and for permitting water to drain from said first valve means and from said bowl when no animal is sensed.

4,986,222

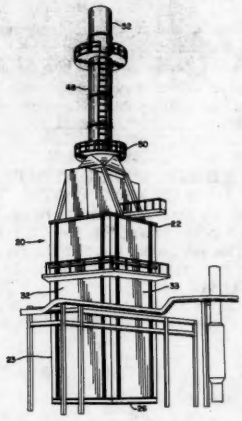
FURNACE FOR OIL REFINERIES AND PETROCHEMICAL PLANTS

Frank W. Pickell, Alvin; John Z. Varesic, Friendswood, both of Tex.; M. Shannon Melton, Tulsa, and Sidney H. Melton, Broken Arrow, both of Okla., assignors to Amoco Corporation, Chicago, Ill.

Filed Aug. 28, 1989, Ser. No. 399,307

Int. Cl.[5] F22B *37/00*

U.S. Cl. 122—6 R **12 Claims**



1. A furnace for use in oil refineries and petrochemical plants, comprising:

burner means for heating a hydrocarbon feedstock;

stack means positioned above said burner for discharging combustion gases emitted from said burner means;

wall means peripherally enclosing and annularly surrounding said burning means;

substantially uniform heat distribution including a set of substantially horizontal radiant furnace tubes extending along said wall means for passage of said hydrocarbon feedstock about said burner means; and

a composite floor under said burner means having refractory bricks, temperature and strain resistant ceramic fiber boards beneath said bricks, high density ceramic fiber modules beneath said boards, and a carbon steel plate beneath said modules with an underside having a corrosion resistant coating.

4,986,223

INTERNAL COMBUSTION ENGINE INJECTION SUPERHEATED STEAM

Fred G. Mahoney, 505 Dorseyville Rd., Pittsburgh, Pa. 15238

Filed Dec. 12, 1988, Ser. No. 283,547

Int. Cl.[5] F02D *19/00*

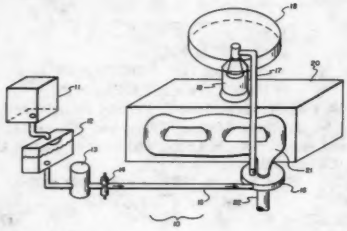
U.S. Cl. 123—25 B **15 Claims**

1. A method for introducing water vapor to the combustion chambers of an internal combustion engine comprising:

introducing a metered amount of liquid water into a heat exchanger;

contacting said heat exchanger directly with hot exhaust gases emanating from the exhaust manifold;

maintaining said water in said heat exchanger for a period sufficient to vaporize said water into steam and superheat same;



reducing pressure and increasing temperature to create superheated steam;

introducing said superheated steam into the air supply proximate to the air induction system, upstream of any carburetion, of said internal combustion engine.

4,986,224

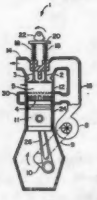
FOUR CYCLE DIESEL ENGINE WITH PRESSURIZED AIR COOLING SYSTEM

Natalio J. Zuffi, 2G River Run, New Hartford, Conn. 06057

Continuation-in-part of Ser. No. 309,432, Feb. 13, 1989, abandoned. This application Jun. 7, 1990, Ser. No. 534,474

Int. Cl.[5] F01P *1/00*

U.S. Cl. 123—41.56 **8 Claims**



1. An internal combustion engine apparatus which comprises:

a cylinder having a head;

an intake valve cooperating with said head for selectively allowing passage of fluids into said cylinder and an exhaust valve for selectively allowing passage of fluids out of said cylinder means for opening said exhaust and inlet valves together during both said intake and exhaust phases of operation of said engine;

a piston mounted for reciprocal movement in said cylinder between a top dead center position and a bottom dead center position;

said cylinder having at least one opening therein, said opening being disposed in a side wall thereof intermediate said top dead center position and said bottom dead center position, said opening communicating between the interior of said cylinder and space outside of said cylinder, said opening being fully covered by said piston in at least one position of said piston; and

means for pressurizing air; and

means for fluid coupling said means for pressurizing air to said opening and to said intake valve simultaneously during both intake and exhaust phases of said engine.

4,986,225

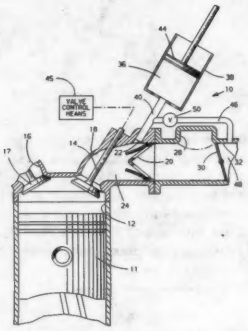
INTAKE RESERVOIR SYSTEM FOR AN ENGINE HAVING A CHECK VALVE

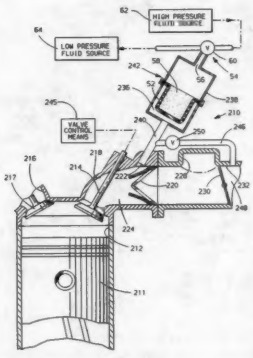
Ko-Jen Wu, Troy, and Richard S. Davis, Romeo, both of Mich., assignors to General Motors Corporation, Detroit, Mich.

Filed Jun. 8, 1990, Ser. No. 534,990

Int. Cl.[5] F02M *35/10*

U.S. Cl. 123—52 MF **7 Claims**





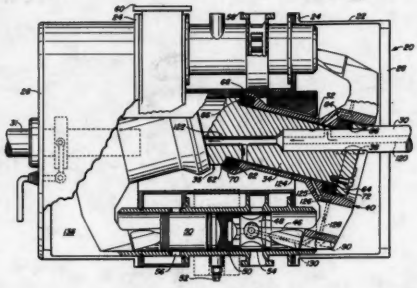
1. An intake reservoir system for an engine having an intake passage leading to a cylinder, a check valve in the intake passage to allow fluid flow toward the cylinder and obstruct fluid back-flow in the reverse direction, and a bypass port located on the intake passage so that the bypass port communicates with a trapped volume defined by the portion of the intake passage between the check valve and cylinder, the intake reservoir system comprising inflow means for enabling fluid to flow into the trapped volume when the pressure therein is at least equal to the pressure upstream of the check valve, the intake reservoir system further comprising a reservoir cavity, a port passage connected between said reservoir cavity and the bypass port enabling communication between said reservoir cavity and the trapped volume, and a volume control means enabling adjustment of the volume of said reservoir cavity.

4,986,226

INTERNAL COMBUSTION ENGINE

James W. Lacy, 255 McCart St., Fernley, Nev. 89408

Filed Jan. 22, 1990, Ser. No. 467,981
Int. Cl.[5] F02B 75/26
U.S. Cl. 123—58 BC 15 Claims



1. An internal combustion engine comprising:
an engine block including a plurality of parallel, spaced apart cylinder modules, each module having a cylinder bore and a pair of pistons in each bore which are simultaneously movable in opposite directions;
fuel injection means between each pair of pistons;
rotatable shaft means parallel to said cylinder modules;
a wobbler member connected to and rotatable with said shaft means, said wobbler member having a pair of cylindrical shaped end portions connected by a central portion, each said cylindrical end portion having a centerline forming an angle with said rotatable shaft;
a spider assembly connected to each said wobbler end portion;
a pair of bearing members within each said spider assembly located at opposite ends of each said wobbler end portion, each said bearing member having a general frustro-conical annular shape with relieved areas in its outer surface to provide reduced bearing friction;
a connecting rod for each said piston having an outer end and an inner end;
means for fixing the outer end of each connecting rod to said spider assembly;
means for connecting the inner end of each connecting rod to a said piston so as to provide both rotational as well as linear side movement of said connecting rod inner end within its piston; and
lubrication means for supplying liquid lubricant under pressure to said bearings and said inner ends of said pistons.

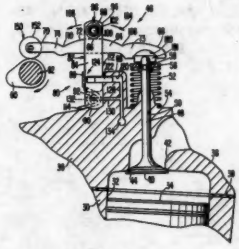
4,986,227

VARIABLE LIFT VALVE TRAIN

Albert B. Dewey, III, 3424 Washington Dr., Falls Church, Va. 22041

Filed May 8, 1990, Ser. No. 520,550
Int. Cl.[5] F01L 1/18
U.S. Cl. 123—90.16 15 Claims

1. A variable lift valve train comprising:
a valve;
a valve actuator including a cam;
a rocker arm at one end engaging said valve and at its other end engaging said valve actuator such that movement of said valve actuator generally in one direction causes movement of said valve generally in an opposite direction, said rocker arm having a fulcrum-engaging surface extending generally between said rocker arm ends; and
a variable-position fulcrum assembly including:
a pivot arm, said pivot arm at one end pivotally mounted to a pivot point and at its other end carrying a fulcrum element engaging said rocker arm fulcrum-engaging surface to define a variable fulcrum point, the position of said pivot arm determining the position of the variable fulcrum point along said rocker arm fulcrum-engaging surface, and



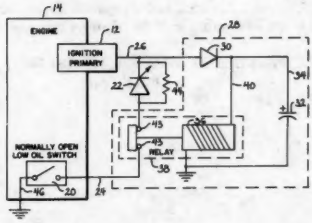
a control element engaging said pivot arm for setting the position of said pivot arm.

4,986,228

LOW OIL PRESSURE INTERLOCK SWITCH

Paul A. Tharman, Milwaukee, Wis., assignor to Briggs & Stratton Corporation, Wauwatosa, Wis.

Filed Nov. 1, 1989, Ser. No. 430,600
Int. Cl.[5] F02P 11/02
U.S. Cl. 123—179 BG 3 Claims



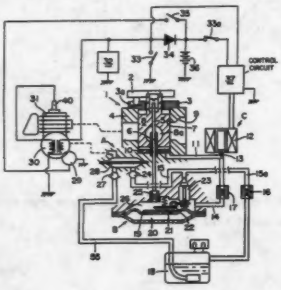
1. In an apparatus having an internal combustion engine and an ignition system having a main core that includes a primary winding to produce an ignition pulse, and having a low oil pressure switch which activates when the engine oil pressure is below a predetermined level, the improvement comprising:
an interlock switch means, interconnected with both said primary winding and said low oil pressure switch, for disabling said low oil pressure switch when the engine is not running, said interlock switch means comprising:
a diode having its anode connected in series with said primary winding;
a first switch means, connected to said low oil pressure switch, for closing after said engine starts running and for opening after said engine stops running; and
a capacitor connected in series with the cathode of said diode, said capacitor discharging through said first switch means after said engine stops running to open said first switch means.

4,986,229

APPARATUS FOR SUPPLYING START FUEL FOR A CARBURETOR

Shin Suzuki, Natori; Shuichi Sasaki, Shibata, and Masao Suzuki, Igu, all of Japan, assignors to Walbro Far East, Inc., Kawasaki, Japan

Filed Nov. 13, 1989, Ser. No. 434,298
Claims priority, application Japan, Nov. 26, 1988, 63-299026
Int. Cl.[5] F02M 1/08
U.S. Cl. 123—179 G 6 Claims



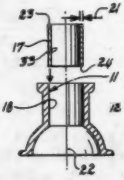
1. An apparatus for supplying start fuel for a carburetor, wherein an internal combustion engine provided with a fly-wheel magneto for supplying start fuel from a fuel chamber of a carburetor to an air intake passage via an electromagnetic valve characterized in the said electromagnetic valve is actuated by an output signal of a primary coil of said fly-wheel magneto.

4,986,230

METHOD OF JOINING CYLINDER BORE LINERS TO AN ENGINE BLOCK

James R. Panyard, Livonia, and Benjamin P. Winter, Canton, both of Mich., assignors to Ford Motor Company, Dearborn, Mich.

Filed Dec. 27, 1989, Ser. No. 457,644
Int. Cl.[5] F02F 1/00
U.S. Cl. 123—193 C 13 Claims



1. A method of ball-staking a cylinder liner to a cast engine block bore while at ambient conditions, comprising:

(a) inserting a cylindrical work hardenable liner into a complementary sized cylindrical bore wall of said block, with a radial spacing therebetween of 0.005 inch; and

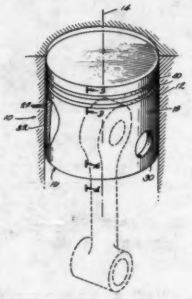
(b) forcing a nondeformable mandrel throughout the interior length of said cylindrical liner to uniformly circumferentially expand the radially outer surface of said liner into full annular surface-to-surface heat exchange relationship with the interior surface of said bore wall, said mandrel having a cross-sectional radius greater than the interior radius of said liner by a dimension which is at least 0.001 inch in excess of said radial spacing.

4,986,231

PISTON WITH GRAPHITE FIBER MESH

Peter W. Brown, Hartland, Wis., assignor to Outboard Marine Corporation, Waukegan, Ill.

Filed May 4, 1989, Ser. No. 347,451
Int. Cl.[5] F02F 3/00
U.S. Cl. 123—193 P 11 Claims



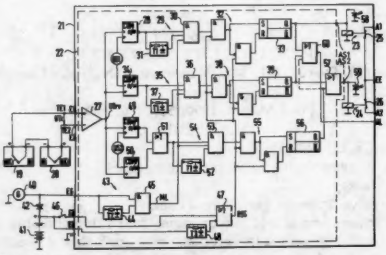
2. A method of manufacturing a piston comprising the steps of forming a mesh of woven graphite fibers arranged to include mesh voids between the fibers and into the general shape of a cylinder having a cylindrical portion, an open end, and a closed end, casting metal around the mesh so that the mesh voids are filled, and so that a work object is formed, and machining the work object to form at least a portion of the piston so that graphite from the cylindrical portion of the mesh is generally uniformly peripherally exposed.

4,986,232

ARRANGEMENT FOR RECOGNIZING MISFIRINGS IN INTERNAL COMBUSTION ENGINES WITH EXTERNALLY CONTROLLED IGNITION

Axel Richter, Wimsheim; Patric Lardy, Weil der Stadt; Ulrich Schempp, Tiefenbronn, and Herbert Glueck, Friolzheim, all of Fed. Rep. of Germany, assignors to Dr. Ing. h.c.F. Porsche AG, Fed. Rep. of Germany

Continuation of Ser. No. 379,968, Jul. 14, 1989, abandoned. This application Aug. 7, 1990, Ser. No. 563,847
Claims priority, application Fed. Rep. of Germany, Sep. 15, 1988, 8811670[U]
Int. Cl.[5] F02D 7/00
U.S. Cl. 123—481 22 Claims



1. An arrangement for recognizing misfirings of a multi-cylinder internal combustion engine with externally supplied ignition, the cylinders of the internal combustion engine being combined into groups of cylinders having separate ignition circuit means, comprising:

a pair of thermo-elements operatively connected with each

other in opposite polarity, one thermo-element each of the theremo-element pair being arranged in the exhaust tract of a cylinder of each group of cylinders, the thermo-element pair having free ends, with a thermo-voltage being produced at the free ends; and

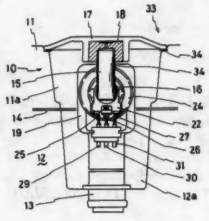
threshold circuit means for detecting the thermo-voltage and interrupting a supply of fuel to a particular group of cylinders in response to a specified detected thermo-voltage that indicates the ignition circuit means of that particular group of cylinders is defective.

4,986,233

IGNITION DEVICE FOR AN ENGINE

Motonobu Akagi, Anjo, and Yoshiyuki Okamoto, Kariya, both of Japan, assignors to Aisin Seiki Kabushiki Kaisha, Kariya, Japan

Filed Sep. 15, 1989, Ser. No. 407,587
Claims priority, application Japan, Sep. 30, 1988, 63-128248
Int. Cl.[5] F02P *15/00*
U.S. Cl. 123—634 **6 Claims**



1. An ignition device for an engine, comprising:

a case having a lower portion releasibly fittable around a spark plug mounted to a cylinder head of the engine;

a first bobbin having a first coil wound thereon, said first bobbin being supported by said case and said first coil being connectable to an ignition system of the engine;

a second bobbin having a second coil wound thereon, said second bobbin being supported by said case concentric with said first bobbin;

means for electrically connecting said second coil to a spark plug around which said lower portion of said case is fitted;

a C-shaped core positioned outside of said case and having distal ends fitted in said bobbins; and

an ignition cover removably mounted to a cylinder head cover of the engine and supporting said core when said lower portion of said case is fitted around a spark plug, whereby said ignition device may be removed from the spark plug without removing the cylinder head cover.

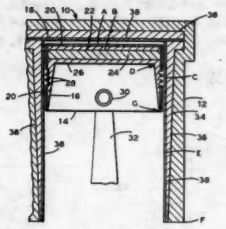
4,986,234

POLYMETALLIC PISTON-CYLINDER CONFIGURATION FOR INTERNAL COMBUSTION ENGINES

James A. E. Bell, Oakville, Canada, assignor to Inco Limited, Canada

Filed Oct. 31, 1989, Ser. No. 429,388
Int. Cl.[5] F02F *3/00*; B32B *15/00*
U.S. Cl. 123—193 CP **6 Claims**

1. A piston and cylinder combination for internal combustion engines, the combination comprising a cylinder and a piston disposed therein, the cylinder and piston having compositions of at least two alloys with different coefficients of thermal expansion gradually decreasing from one having a substantial percentage of a lower coefficient of expansion alloy to one having a substantial percentage of a higher coefficient of expansion alloy, the volumetric percentage of the alloys maintaining a substantially straight cylinder bore and piston side over an ambient to operating temperature range.

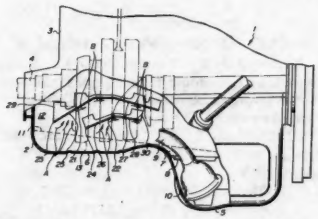


4,986,235

OIL PAN FOR INTERNAL COMBUSTION ENGINE

Akira Ishii; Takashi Terui, both of Yokohama; Toyoki Hiraoka, Tokyo, and Yuichi Murakami, Yokohama, all of Japan, assignors to Nissan Motor Co., Ltd., Yokohama, Japan

Filed Mar. 29, 1990, Ser. No. 501,119
Claims priority, application Japan, Apr. 3, 1989, 1-81568
Int. Cl.[5] F16N *31/00*
U.S. Cl. 123—195 C **16 Claims**



1. An oil pan for an internal combustion engine, comprising:

a shallow bottom section fixedly disposed under a cylinder block of the engine, said shallow bottom section defining therein a first space in which at least a part of a crankshaft of the engine is disposed;

a sump section fixedly disposed under the cylinder block and integral with said shallow bottom section, said sump section defining therein a second space communicated with said first space, a lower part of said second space being lower in level than that of said first space; and

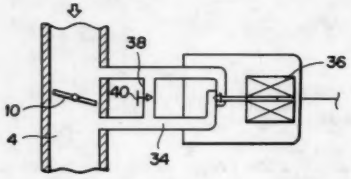
a guide plate for lubrication oil, fixed to inner surface of said shallow bottom section and extending generally along an axis of said crankshaft, said inner surface being located in a side to which lubrication oil is splashed by said crankshaft under rotation, said guide plate having an inclined part, and a guide part which is continuously connected with said inclined part and located nearer to said second space than said inclined part, said inclined part gradually becoming high in level in a direction toward said second space, said guide part extending toward said second space to guide lubrication oil to said second space.

4,986,236

IDLE SPEED CONTROL APPARATUS

Yoshiyuki Kobayashi, Shizuoka, Japan, assignor to Suzuki Jidosha Kogyo Kabushiki Kaisha, Shizuoka, Japan

Filed Jan. 23, 1990, Ser. No. 469,040
Claims priority, application Japan, Jan. 31, 1989, 1-21535
Int. Cl.[5] F02D *41/16*
U.S. Cl. 123—339 3 Claims



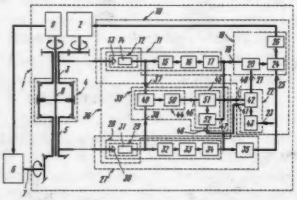
1. In an idle speed control apparatus for feedback controlling the idle speed of an internal combustion engine to a target idle speed by a bypass inlet rate control valve disposed in a bypass inlet air passage for communicating a main inlet air passage bypassing an inlet throttle valve of the internal combustion engine and regulating said target idle speed by an auxiliary bypass inlet air quantity regulating device disposed in an auxiliary bypass inlet air passage for communicating said bypass inlet air passage bypassing said bypass inlet air quantity control valve, the improvement comprising control means for controlling such that when said target idle speed is regulated by said auxiliary bypass inlet air quantity regulating device, an engine speed blind section with respect to said target idle speed becomes a small engine speed range when said bypass inlet air quantity control valve is feedback controlled by inputting a predetermined target idle speed regulating signal.

4,986,237

HEAT ENGINE SPEED GOVERNOR

Anatoly V. Kozlov; Jury F. Khaimin; Grigory Y. Vainshtein, all of Leningrad, and Vladimir I. Marakin, Krasnoobsk, all of U.S.S.R., assignors to Nauchno-Proizvodstvennoe Objedinenie Po, etc., Leningrad, U.S.S.R.

PCT No. PCT/SU87/00107, § 371 Date May 26, 1989, § 102(e) Date May 26, 1989, PCT Pub. No. WO89/03078, PCT Pub. Date Apr. 6, 1989
PCT Filed Sep. 29, 1987, Ser. No. 362,381
Int. Cl.[5] F02D *41/14*; G05D *13/62*
U.S. Cl. 123—352 5 Claims



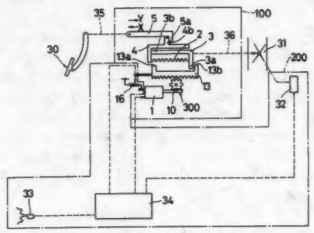
1. A heat engine speed governor comprising a differential mechanism, a first input shaft of the differential mechanism being operatively connected to a unidirectional electric motor, a second input shaft being rotated by the heat engine, and an output shaft being operatively connected to a fuel metering member of the heat engine, a channel for controlling the electric motor speed, in which a means for measuring speed of the first input shaft of the differential mechanism is connected to an input of a device for forming a control signal having an output connected to the electric motor and a master input connected to an output of a device for forming an electric motor speed control program having an input for putting in a master signal, and a channel for correcting the electric motor speed in accordance with speed of the heat engine in which a means for measuring speed of the second shaft of the differential mechanism has an output connected to an input of a differentiating unit having an output connected to a correcting input of the device for forming a control signal in the electric motor speed control channel, the improvement comprising a channel for controlling position of the fuel metering member of the heat engine having sensors of angular positions of the first and second input shafts of the differential mechanism, the sensors having outputs connected to inputs of a device for determining the difference between coordinates of angular positions of the first and second input shafts of the differential mechanism, an output of the difference determining device being connected to a control input of the device for forming an electric motor speed control program, the output of the means for measuring speed of the second input shaft of the differential mechanism being connected to a data input of the device for forming an electric motor speed control program.

4,986,238

THROTTLE CONTROL SYSTEM

Tadashi Terazawa, Toyota, Japan, assignor to Aisin Seiki Kabushiki Kaisha, Kariya, Japan

Filed Aug. 31, 1989, Ser. No. 401,168
Claims priority, application Japan, Aug. 31, 1988, 63-216753
Int. Cl.[5] F02D *41/00, 11/10*
U.S. Cl. 123—361 7 Claims



1. A throttle control system for a throttle valve of a vehicle having an accelerator control mode, a constant speed running mode and a slip control mode of operation, comprising:

an output member for operating said throttle valve;

accelerator-actuated means for driving said output member in said accelerator control mode;

an actuator;

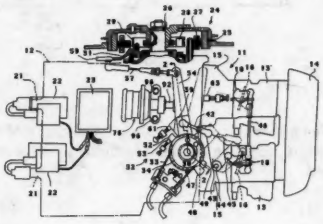
power transmitting means interconnecting said actuator and said output member for transmitting power to said output member in both said constant speed running mode and said slip control mode, said power transmitting means including a first power transmitting element movable within a range of movement; and control means for sensing the position of said first power transmitting element within its range of movement and deactivating said power transmitting means when said first power transmitting element is sensed to be in a predetermined portion of its range of movement during modes of operation other than said constant speed running mode, so as to restrict the opening of the throttle in such mode of operation other than said constant speed running mode.

4,986,239

IGNITION TIMING CONTROLLER FOR INTERNAL COMBUSTION ENGINE

Hiroshi Oishi, Hamamatsu, Japan, assignor to Sanshin Kogyo Kabushiki Kaisha, Hamamatsu, Japan

Filed Oct. 26, 1988, Ser. No. 262,967
Claims priority, application Japan, Oct. 29, 1987, 62-274263
Int. Cl.[5] F02P 5/02
U.S. Cl. 123—413 2 Claims



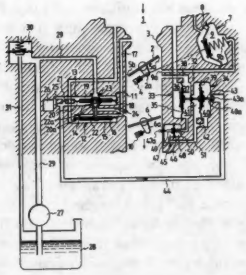
1. In an ignition timing control for a spark ignited internal combustion engine and for improving running levels during extreme deceleration, comprising a throttle control for controlling the speed of the engine, spark control means for providing a first normal spark advance curve in relation to engine speed under normal changes in engine speed, means for determining the existence of a movement of said throttle control to effect a rapid reduction in engine speed that could effect uneven running, and means for effecting an advance in the spark timing from said normal spark advance curve in response to the determining of the existence of movement of said throttle control to effect a rapid rate of deceleration of engine speed comprising a spark control lever supported for pivotal movement in response to changes in position of the throttle control and connected to said throttle control by means including resilient biasing means and damping means acting upon the park control lever for retarding the movement of the spark control lever under the movement of the throttle control toward its idle position.

4,986,240

FUEL INJECTION DEVICE FOR INJECTION CARBURETORS

Tetsuo Muraji, and Mitsuru Sekiya, both of Odawara, Japan, assignors to Mikuni Kogyo Kabushiki Kaisha, Tokyo, Japan

Filed May 16, 1989, Ser. No. 352,299
Int. Cl.[5] F02M 39/00
U.S. Cl. 123—452 10 Claims



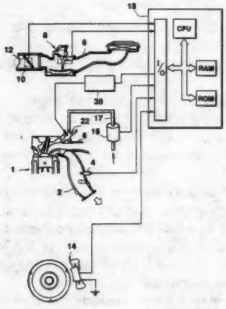
1. A fuel injection device for injection carburetors comprising a slow fuel control unit for ejecting fuel at relatively low rates into a suction tube in accordance with relatively low flow rates of air to be sucked into said suction tube, and a main fuel control unit for ejecting the fuel at relatively high rates into said suction tube in accordance with relatively high flow rates of air to be sucked into said suction tube, each of said slow fuel control unit and said main fuel control unit comprising an air pressure regulator and a fuel pressure regulator adjacent to said air pressure regulator, said fuel pressure regulator of said slow fuel control unit and said fuel pressure regulator of said main fuel control unit have a common fuel passage, and said fuel pressure regulator of said slow fuel control unit being arranged at the downstream side of said fuel pressure regulator of said main fuel control unit on said common fuel passage.

4,986,241

INTERNAL COMBUSTION ENGINE AIR-FUEL RATIO CONTROL SYSTEM INCLUDING ALCOHOL SENSOR BACK-UP CONTROL ARRANGEMENT

Ryuzaburo Inoue, Yamato, and Tadaki Oota, Fujisawa, both of Japan, assignors to Nissan Motor Company, Ltd., Japan

Filed Feb. 21, 1990, Ser. No. 483,029
Claims priority, application Japan, Feb. 23, 1989, 1-43587; Mar. 29, 1989, 1-79372; Mar. 29, 1989, 1-79373
Int. Cl.[5] F02D 41/14
U.S. Cl. 123—479 6 Claims



1. In an internal combustion engine having a combustion chamber comprising;

means for sensing the driving conditions of the engine;

means for sensing the air-fuel ratio of the air-fuel mixture being supplied to the combustion chamber of said engine;

means for sensing the amount of alcohol contained in the fuel being supplied to the engine;

means for monitoring the output of said alcohol sensing means and determining if a malfunction has occurred in said alcohol sensing means;

means responsive to the engine driving conditions for determining the basic fuel supply amount;

means responsive to the amount of alcohol contained in the fuel for producing an alcohol correction factor via which the basic fuel supply amount is corrected;

means responsive to the output of the air-fuel ratio detection means for producing an air-fuel ratio correction factor for feedback controlling the air-fuel ratio within a predetermined range;

control means responsive to the alcohol correction factor and the air-fuel ratio correction factor for determining the corrected basic fuel supply amount, said control means being arranged so that in response to said monitoring means detecting a malfunction in said alcohol sensor, change in said alcohol correction factor in response to the output of said alcohol sensor is suspended, the alcohol correction factor is calibrated using the output of the air-fuel ratio sensing means, and at least the amended

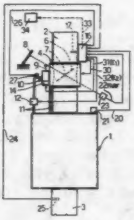
alcohol correction factor is used for controlling the setting of the basic fuel supply amount.

4,986,242

ELECTRONIC FUEL INJECTION SYSTEM FOR AN INTERNAL COMBUSTION ENGINE

Silverio Bonfiglioli, Zola Predosa, and Massimo Fato, Modena, both of Italy, assignors to Weber S.r.l., Turin, Italy

Filed Feb. 7, 1989, Ser. No. 307,781
Int. Cl.[5] F02D *41/14, 41/04, 41/22*
U.S. Cl. 123—479 **10 Claims**



1. An electronic fuel injection system for an internal combustion engine, comprising:

an intake pipe fitted with a single point electronic injection unit;

a main throttle fitted to said intake pipe at said unit, said throttle having a rotary shaft set mechanically by an accelerator where the minimum rotation of said shaft is controlled mechanically by a piston from a heat-sensitive element;

an electronic control system mounted onto said intake pipe, said control system comprising a central processing unit (CPU) and an analogue-digital converter block, said control system further connected to RAM and EPROM memory blocks; said CPU controlling operation of said single-point electronic injection unit;

a first input signal from an ignition coil received by said control system;

a second input signal from a single track, substantially linear potentiometer received by said control system;

a third input signal from an exhaust pipe sensor received by said control system, said exhaust pipe sensor capable of detecting the concentration of at least one exhaust gas component;

a fourth input signal from a cooling water sensor and an air supply temperature signal from an air supply temperature sensor received by said control system, said air supply temperature sensor being supported directly on said electronic control system.

4,986,243

MASS AIR FLOW ENGINE CONTROL SYSTEM WITH MASS AIR EVENT INTEGRATOR

Harold E. Weissler, II, Newport News, and Benjamin G. Shirey, Hampton, both of Va., assignors to Siemens Automotive L.P., Troy, Mich.

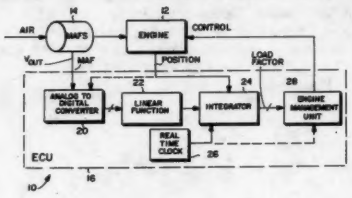
Filed Jan. 19, 1990, Ser. No. 467,823
Int. Cl.[5] F02M *51/00*
U.S. Cl. 123—488 **21 Claims**

1. A mass air flow metering system of the type responsive to the mass of air flowing into an internal combustion engine, said metering system comprising:

a mass air flow sensor providing an output signal V_{out} responsive to mass air flow;

an analog to digital converter connected to receive said output signal V_{out} which produces a first digital signal corresponding to said output signal V_{out}; and

linearizing means connected to receive said first digital signal for mapping said digital signal into a further digital signal substantially linearly related to said mass of air



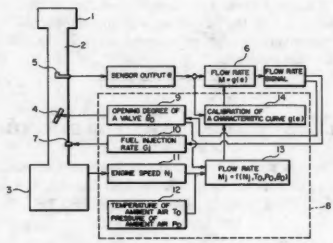
flowing into said internal combustion engine, said linearizing means providing said further digital signal at an output thereof.

4,986,244

INTERNAL COMBUSTION ENGINE

Junichi Kobayashi, Ushiku, and Takashi Mizumori, Ibaraki, both of Japan, assignors to Hitachi, Ltd., Tokyo, Japan

Filed Apr. 26, 1989, Ser. No. 343,440
Claims priority, application Japan, Apr. 28, 1988, 63-106592
Int. Cl.[5] F02D *41/18*; G01F *25/00*
U.S. Cl. 123—488 **5 Claims**


SENSOR OUTPUT θ
FLOW RATE M = g(θ)
FLOW RATE SIGNAL
OPENING DEGREE OF A VALVE θ
CALIBRATION OF A CHARACTERISTIC CURVE g(θ)
FUEL INJECTION RATE Gf
ENGINE SPEED Ni
FLOW RATE Mj = f(Ni),To,Po,Ab
TEMPERATURE OF AMBIENT AIR To
PRESSURE OF AMBIENT AIR Po

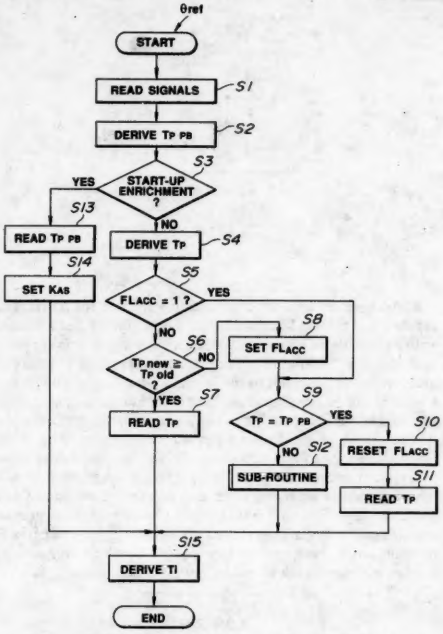
1. An internal combustion engine comprising: a sensor capable of generating a signal corresponding to the flow rate of intake air supplied to said internal combustion engine; first air flow rate computing means incorporating flow-rate conversion function for converting said signal into a value of the intake air flow rate; second air flow rate computing means capable of computing a value of the intake air flow rate at least from the opening of an air flow rate control valve for controlling the intake air flow rate, the temperature of the ambient air, the pressure of the atmosphere and the speed of said internal combustion engine; and a fuel injection device for injecting a fuel into the passage of the intake air; wherein said flow rate conversion function being calibrated in succession in accordance with the value of intake air flow rate computed by said second air flow rate computing means, and said fuel injection device is controlled in accordance with the value of the intake air flow rate computed by said first air flow rate computing means thereby controlling the air-fuel ratio of the mixture supplied to said internal combustion engine.

4,986,245

CONTROL SYSTEM FOR INTERNAL COMBUSTION ENGINE WITH IMPROVED TRANSITION CHARACTERISTICS

Shinpei Nakaniwa, and Masuo Kashiwabara, both of Gunma, Japan, assignors to Japan Electronic Control Systems Company, Limited, Isezaki, Japan

Filed Nov. 8, 1988, Ser. No. 268,560
Claims priority, application Japan, Nov. 10, 1987, 62-281963
Int. Cl.[5] F02D 41/10, 43/04
U.S. Cl. 123—492 29 Claims



1. A control system for an internal combustion engine, comprising:

first sensor means for monitoring an engine driving condition to produce engine driving condition representative data;

second means active in a steady state of said engine for deriving a basic fuel supply amount on the basis of said engine driving condition representative data according to a predetermined first characteristic;

third means for detecting an engine transition state;

fourth means, responsive to said third means detecting said engine transition state, for deriving a basic fuel injection amount according to a predetermined second characteristic, in which a variation rate of said basic fuel injection amount versus variation of said engine driving condition is greater than in said first characteristic;

fifth means for setting a calculated fuel supply amount, said fifth means operating in a first mode for deriving said calculated fuel supply amount on the basis of said basic fuel supply amount derived by said second means and in a second mode, in response to said third means detecting said engine transition state, for deriving said calculated fuel supply amount on the basis of said basic fuel injection amount derived by said fourth means; and

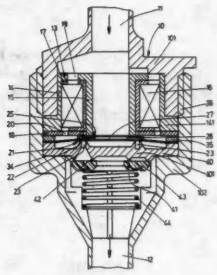
sixth means for performing fuel supply for a controlled amount of fuel corresponding to said calculated fuel supply amount set by said fifth means.

4,986,246

VALVE FOR THE METERED ADMIXTURE OF VOLATILIZED FUEL TO THE FUEL-AIR MIXTURE OF AN INTERNAL COMBUSTION ENGINE

Achill Kessler de Vivie, Sindelfingen; Ernst Linder, Muehlacker; Helmut Rembold, Stuttgart; Manfred Ruoff, Moeglingen, and Walter Teegen, Waiblingen-Hohenacker, all of Fed. Rep. of Germany, assignors to Robert Bosch GmbH, Struttgart, Fed. Rep. of Germany

Filed Oct. 20, 1989, Ser. No. 424,780
Claims priority, application Fed. Rep. of Germany, Dec. 31, 1988, 3844453
Int. Cl.[5] F02M 39/04
U.S. Cl. 123—520 24 Claims



1. A valve for the metered admixture of fuel volatilized from the fuel tank of an internal combustion engines to a fuel-air mixture supplied to the engine via an intake manifold, comprising a valve housing having an inflow neck, for connection to a vent neck of a source of fuel vapor, an outflow neck for connection to the intake manifold having a seat valve, disposed in the interior of the valve housing between the inflow and outflow necks, a valve seat surrounding a valve opening and a valve element cooperating with the valve seat, the valve element being actuated by an electromagnet comprising a magnet cup, an exciter coil and an armature, said valve opening being embodied as an annular gap (23) valve element (25) is embodied in the form of an annular disk (26) of magnetically conductive material, which is loaded by a closing force which acts in the closing direction on the seat valve (21) and said disk forms the armature of the electromagnet (13).

4,986,247

FUEL SUPPLY DEVICE OF AN ENGINE

Takahiro Kushibe; Yuichi Takano; Manabu Tateno, all of Susono; Eishi Ohno, Mishima, and Naotaka Shirabe, Nagoya, all of Japan, assignors to Toyota Jidosha Kabushiki Kaisha and Nippondenso Co., Ltd., both of, Japan

Filed Jul. 31, 1989, Ser. No. 386,609
Claims priority, application Japan, Aug. 4, 1988, 63-102691[U]; Aug. 8, 1988, 63-104061[U]; Sep. 5, 1988, 63-115904; Dec. 26, 1988, 63-326124
Int. Cl.[5] F02M 67/10
U.S. Cl. 123—533 22 Claims

1. A fuel supply device of an engine, comprising:

a nozzle opening for injecting fuel and pressurized air;

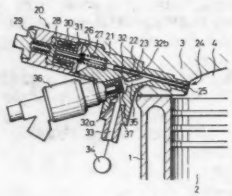
valve means for electromagnetically controlling the opening operation of said nozzle opening;

a nozzle chamber having an air inlet connected to a pressurized air source and having an air outlet separately formed from and spaced from said air inlet and connected to said nozzle opening; and

fuel injection means arranged in said nozzle chamber for injecting fuel,

wherein said valve means comprises a needle arranged in a

needle insertion bore having a diameter larger than that of said needle to control the opening operation of said nozzle opening formed at a tip end of said needle insertion bore,



and said air outlet is connected to said needle insertion bore via a pressurized air outflow passage, said pressurized air outflow passage being tangentially connected to an inner wall of said needle insertion bore.

4,986,248

FUEL SUPPLY SYSTEM FOR INTERNAL COMBUSTION ENGINE USING AN ULTRASONIC ATOMIZER

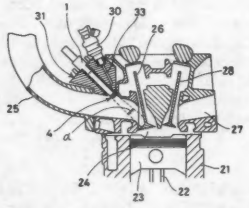
Taiji Kobayashi; Daijiro Hosogai; Kazushi Tsurutani; Noboru Higashimoto, and Kakuro Kokubo, all of Ooi, Japan, assignors to Tonen Corporation, Tokyo, Japan

Filed Mar. 29, 1990, Ser. No. 501,988

Claims priority, application Japan, Mar. 30, 1989, 64-79710; Mar. 31, 1989, 64-80690; Mar. 31, 1989, 64-80691; May 15, 1989, 64-121219; Jun. 29, 1989, 64-168003

Int. Cl.[5] F02M *29/00*

U.S. Cl. 123—590 **5 Claims**



1. A fuel supply system for internal combustion engine furnished with a fuel injection valve and an ultrasonic atomizer on the suction pipe of the engine, said ultrasonic atomizer comprising:

an oscillator member, to which ultrasonic vibration is given by an ultrasonic vibration generating means,

an inner cylinder provided on outer periphery of said oscillator member, an outer cylinder engaged with and fixed on said inner cylinder and forming a fuel supply passage between itself and said inner cylinder, a fuel supply hole formed on said outer cylinder, and a circumferential groove communicated with said fuel supply hole and formed on said inner cylinder,

further comprising an inclined portion formed at the tip of said oscillator member, and a portion with reduced diameter formed at the tip ahead of said inclined portion,

characterized in that said fuel supply passage is arranged face-to-face to said inclined portion.

4,986,249

IGNITION APPARATUS MOUNTING STRUCTURE FOR INTERNAL COMBUSTION ENGINE

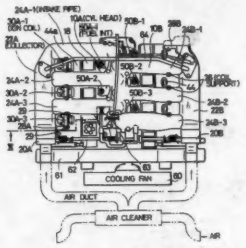
Akihide Nakamura, Yokohama, Japan, assignor to Nissan Motor Co., Ltd., Yokohama, Japan

Filed Sep. 27, 1989, Ser. No. 413,302

Claims priority, application Japan, Oct. 12, 1988, 63-133127[U]

Int. Cl.[5] F02P *3/02*

U.S. Cl. 123—635 **2 Claims**



1. An ignition apparatus mounting structure for an internal combustion engine having at least one cylinder head formed with a plurality of engine cylinders; a plurality of ignition plugs provided for the engine cylinders, respectively; a plurality of ignition coils connected to the ignition plugs, respectively; and a plurality of intake pipes branched from at least one air collector and connected to the engine cylinders, respectively, wherein each of said intake pipes is arranged extending above said cylinder head and across a cylinder line and being offset away from and over each of said ignition plugs each of said ignition coils is arranged over and connected to one of said ignition plugs, and said intake pipes are formed with support members on side surfaces thereof to support at least one of said ignition coils between two support members opposingly formed on two adjacent intake pipes, respectively.

4,986,250

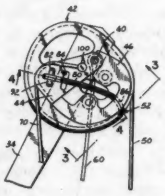
COMPOUND BOW WITH ADJUSTABLE CABLE LENGTH

Rex F. Darlington, 3540 Darton Rd., Hale, Mich. 48739

Filed Mar. 30, 1990, Ser. No. 501,560

Int. Cl.[5] F41B *5/00*

U.S. Cl. 124—25.6 **3 Claims**



1. A compound bow including a center handle section supporting upper and lower limbs having distal ends with attached, grooved, eccentric cam wheel assemblies mounted on a transverse axis, and bowstring and tension cables extending between said wheel assemblies, that improvement which comprises a bowstring having a permanent loop at each end, a diametrical groove formed in each said cam wheel assembly, a plurality of cross slots extending transversely to said groove and spaced along said groove, and a rigid pin transfixing the

loop at each end of said bowstring, said pin having its ends lodged in the ends of a cross slot on either side of said groove to anchor an end of said bowstring, said bowstring being wrapped around a sheave on said cam wheel assembly and turned inwardly toward the center of the wheel to lodge in said groove.

4,986,251

AIRGUN MAGAZINE

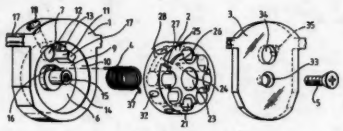
Stephen J. Lilley, Sawston, England, assignor to Utec B. V., Driebergen, Netherlands

Filed May 5, 1989, Ser. No. 348,257

Claims priority, application United Kingdom, May 6, 1988, 8810674.5

Int. Cl.[5] F41B *11/00*

U.S. Cl. 124—67 **27 Claims**



1. An airgun magazine comprising:

a pellet carrier having a plurality of chambers each for receiving a respective airgun pellet;

a housing in which the pellet carrier is movably mounted;

a cover which co-operates with the pellet carrier and the housing to retain pellets in respective ones of the pellet chambers; and

means for causing movement of the pellet carrier in the housing to present successive pellets in the pellet chambers to the breech of an airgun when the pellet carrier is fitted in the airgun:

wherein the magazine is adapted to be detachable as a complete exchangeable unit from an airgun in which the magazine may be used, the arrangement being such that, when the magazine is so removed, the pellet chambers may be loaded with pellets which are then retained in respective ones of the pellet chambers by co-operation between the pellet carrier, housing and cover.

4,986,252

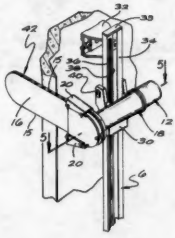
CHAIN SAW CUTTING ASSEMBLY

William K. Holmes, Simi Valley, and Albert E. Joneikis, Long Beach, both of Calif., assignors to Cushion Cut, Inc., Torrance, Calif.

Filed May 6, 1988, Ser. No. 190,865

Int. Cl.[5] B28D *1/08*

U.S. Cl. 125—21 **13 Claims**



1. A chain saw assembly for cutting openings in concrete walls and the like, comprising:

a track mountable to a wall to be cut;

a carriage structure guided by the track for movement in at least one preselected direction along the wall, the carriage structure comprising:

an elongated chain bar having a first major surface facing the track, a second major surface facing away from the track and a circumference with a pair of longitudinal cutting edges, the chain bar being positionable within a kerf formed in the wall so that the cutting edges are perpendicular to the wall;

a cutting chain extending about the chain bar and movable along its circumference;

means for driving the cutting chain along the circumference of the chain bar to cut the wall along the kerf; and

a chain guard structure having at least one auxiliary portion which normally covers part of the second major surface of the chain bar but is removable to place the saw assembly in a first operative condition;

the track and the carriage structure being disposed exclusively on one side of the second major surface in said first operative condition to cut flush along an adjoining wall.

4,986,253

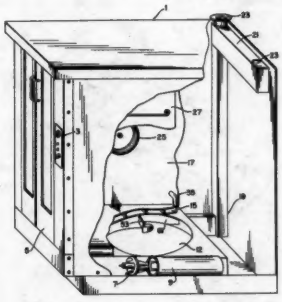
HEAT PIPE CONVECTION OVEN

Walter B. Bienert, Lutherville; Edward J. Jopson, Baltimore, both of Md., and Richard J. Lanza, Leominster, Mass., assignors to The United States of America as represented by the Secretary of the Army, Washington, D.C.

Filed Nov. 27, 1989, Ser. No. 441,725

Int. Cl.[5] F24C *15/32*

U.S. Cl. 126—21 A **10 Claims**



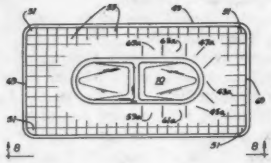
1. A convection oven for baking at uniform temperatures comprising: (a) an oven cavity, (b) a fuel-fired burner and combustion chamber, (c) a heat exchanger through which flows combustion products from the combustion chamber, said heat exchanger being in the form of a helix around which the combustion gases swirl upwardly in heat exchange relationship with a liquid heat transfer medium contained inside the helix, and (d) a vapor chamber which forms the bottom and at least two inside walls of the oven cavity, said vapor chamber being in communication with and receiving heat transfer medium from the heat exchangers.

4,986,254

BAR BURNER

William G. Haen, and Earle L. Pfefferkorn, both of Racine, Wis., assignors to Greene Manufacturing Co., Racine, Wis.

Filed Jul. 2, 1990, Ser. No. 548,507
Int. Cl.[5] A47J 37/00; F24C 3/00
U.S. Cl. 126—41 R 11 Claims



1. An improved bar burner for use in a cooking grill having a top cooking area, such bar burner including:

an elongate body having a pair of curved ends, a pair of substantially parallel side walls extending between such curved ends and a plurality of holes distributed along each side wall for flowing combustible gas therethrough;

each curved end also having a plurality of holes for flowing combustible gas therethrough, such holes being arranged to define an end zone and a pair of angled zones;

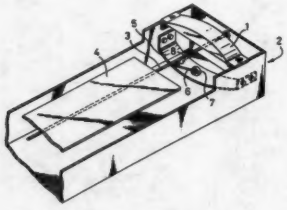
the holes in the angled zones having enlarged cross sectional areas, thereby providing improved heat rejection for more nearly equalizing the temperature across the top cooking area.

4,986,255

APPARATUS PURSUEING THE SUN

Ryohei Ito, 1366, Iihama, Iwamura-cho, Ena-gun, Gifu-ken, Japan

Filed May 8, 1990, Ser. No. 520,347
Claims priority, application Japan, Jun. 12, 1989, 1-681936[U]
Int. Cl.[5] F24J 2/38
U.S. Cl. 126—424 5 Claims



1. Apparatus for pursuing the sun to secure a constant sunlight energy source, comprising:

a rotary shaft equipped with a sunlight receiver;

a thermo-deforming plate secured at its two extremities which deforms to force an area in proximity to a light collecting portion of said plate with a raised temperature to provide a lowest portion of a curved concave;

a convex lens placed over said thermo-deforming plate; and

a follower rod equipped with a rolling piece in its lower end pivotally connected to said rotary shaft in a manner to be able to swivel said shaft in an axial direction of the rotary shaft; and

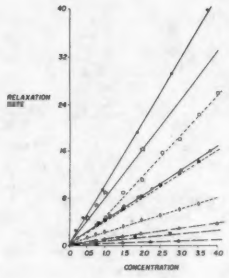
wherein said thermo-deforming plate in curved concave form is disposed underneath and transverse to the rotary shaft and the rolling piece of said follower rod is placed on said thermo-deforming plate in a manner so that the follower rod is forcibly pressed down to place the rolling piece constantly against the curved concave of the thermo-deforming plate formed by thermal deformation.

4,986,256

USE OF PARAMAGNETIC METALLOPORPHYRINS AS CONTRAST AGENTS FOR TUMORS IN MRI IMAGING

Jack S. Cohen, Bethesda; Chi-Wan Chen, Silver Spring; Charles E. Myers, Rockville, all of Md., and Miriam Sohn, Washington, D.C., assignors to The United States of America as represented by the Department of Health and Human Services, Washington, D.C.

Filed Feb. 28, 1985, Ser. No. 706,622
Int. Cl.[5] A61B 17/52
U.S. Cl. 128—653.4 4 Claims



1. A method of enhancing an image obtained from magnetic resonance imaging of a region containing a malignant tumorous growth comprising the steps of administering to a subject a non-lethal amount of a water-soluble paramagnetic Mn(III) porphyrin, or a pharmaceutically acceptable acid form or salt thereof effective to significantly enhance the contrast in a magnetic resonance image between said malignant tumorous growth and the remainder of said image; and then

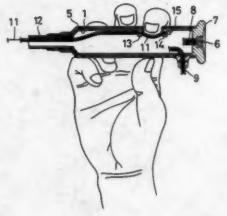
imaging said region of said subject by magnetic resonance.

4,986,257

BENDING DEVICE

Toshio Chikama, Tokyo, Japan, assignor to Kabushiki Kaisha Machida Seisakusho, Tokyo, Japan

Filed Jul. 27, 1990, Ser. No. 558,491
Claims priority, application Japan, Jul. 31, 1989, 1-196706; Jul. 31, 1989, 1-196707; Jul. 31, 1989, 1-196708
Int. Cl.[5] A61B 1/00
U.S. Cl. 128—4 19 Claims



1. A bending device comprising:

(a) a hollow body;

(b) an insertion portion extending from said body;

(c) a bending portion extending from a distal end of said insertion portion; and

(d) a wire fixedly connected at its distal end to a distal end of said bending portion and having a proximal end disposed in said body, said wire extending through said bending portion and said insertion portion into said body;

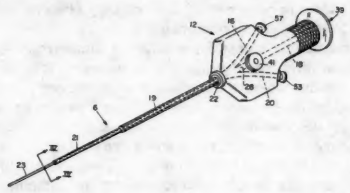
(e) said body having a manipulation hole into which the finger is adapted to be inserted, a guide portion through which said wire is passed and a retainer portion for retaining the proximal end of said wire being formed on an inner surface of said body, said guide portion and said retainer portion being disposed in opposed relation to each other, said manipulation hole being disposed between said guide portion and said retainer portion, part of said wire being disposed in said manipulation hole, and said wire receiving a force applied, in a direction perpendicular to a longitudinal direction of said wire, by the finger inserted in said manipulation hole, so that said wire is pulled to bend said bending portion.

4,986,258

ENDOSCOPE WITH TAPERED SHAFT

George E. Cho, Sudbury, and Horace Furumoto, Wellesley, both of Mass., assignors to Candela Laser Corporation, Wayland, Mass.

Filed Feb. 6, 1989, Ser. No. 307,321
Int. Cl.[5] A61B *1/30*
U.S. Cl. 128—7 **27 Claims**



1. A rigid endoscope comprising:

a rigid shaft which is sufficiently rigid such that it is displaced through axial and rotational translation by maneuvering one end of the shaft, the rigid shaft having a plurality of stages of different outside diameter, the stages being in order of outside diameter with a smaller diameter stage being at a distal end of the shaft and a step between the first and second stages positioned in the distal third of the rigid shaft to enter and dilate a ureter.

4,986,259

APPARATUS AND METHOD FOR DISINTEGRATING CALCULUS

Satoshi Aida, and Nobuyuki Iwama, both of Kanagawa, Japan, assignors to Kabushiki Kaisha Toshiba, Kanagawa, Japan

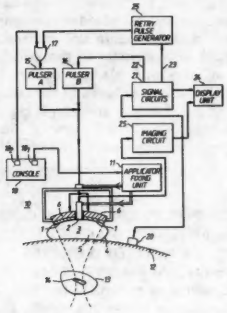
Filed Mar. 1, 1989, Ser. No. 317,531
Int. Cl.[5] A61B *17/22*
U.S. Cl. 128—24 A **11 Claims**

1. An apparatus for disintegrating a calculus in a living body using ultrasonic shock waves comprising:

ultrasonic transducer means having a focal point for emitting a first ultrasonic shock wave having a first energy level and for emitting a second ultrasonic shock wave having a second energy level greater than the first energy level, the second ultrasonic shock wave being emitted to disintegrate a calculus after emission of the first ultrasonic shock wave;

sound receiver means for receiving audio sounds from the living body and for transforming the audio sounds into electrical signals, said audio sounds being generated by the living body responsive to exposure to said first ultrasonic sound wave; and

confirmation means, coupled to said sound receiver means, for determining whether the position of the calculus coincides with the focal point of the ultrasonic transducer



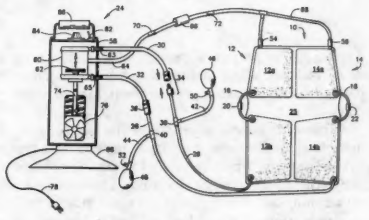
means by analyzing the electrical signals received from said sound receiver means.

4,986,260

APPARATUS AND METHOD FOR PROVIDING CONTINUOUS PASSIVE MOTION TO THE SPINE

John F. Iams, Poway, and Robson L. Splane, Jr., Granada Hills, both of Calif., assignors to Superspine, Inc., Poway, Calif.

Continuation of Ser. No. 871,319, Jun. 6, 1986, abandoned. This application Nov. 16, 1987, Ser. No. 121,534
Int. Cl.[5] A61H *1/00*
U.S. Cl. 128—24 R **26 Claims**



1. A fluid operated device for applying continuous passive motion to a person's spine in a manner which simulates natural motions of spinal joints, which device comprises:

a. at least two inflatable bladders to be positioned substantially in a plane on opposite sides of a person's spine, one principal surface of each bladder adapted to be positioned in use against a fixed object and the other prinicipal surface adapted to be positioned against an associated area of the person's body, each of said bladders being off sufficient (i) area, (ii) deflated contracted volume and inflated distended volume so that successive pressurizations and depressurizations of each bladder will provide multidimensional movement of the spinal joints;

b. fluid conduit and control means for connecting the interiors of said bladders and for allowing fluid from the first bladder to flow into the interior of the second bladder at a continuous, controlled rate during inflation of the first bladder;

c. pump means to force fluid under pressure intermittently from a source of fluid into said interior of said first bladder; and

d. exhaust means to exhaust fluid from said interior of said second bladder;

the pump rate of said pump means and the rate of fluid flow through the fluid conduit and control means being selected so that as said first bladder is inflated, the second bladder is simultaneously being inflated at a lesser rate and as the first bladder begins to deflate, the second bladder continues to inflate, the first and second bladders filling and exhausting in sequence such that the peak displacement to the associated area of the person's body of said first bladder occurs before the peak displacement tot he associated area of the body by said second bladder, the sequential filling and emptying of said bladders inducing multi-dimensional movement of the spinal joints of the section of the spine adjacent to the bladders.

4,986,261

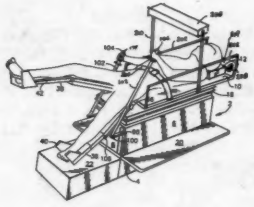
APPARATUS FOR PERFORMING COORDINATED WALKING MOTIONS WITH THE SPINE IN AN UNLOADED STATE

John F. Iams, Poway, and Robson L. Splane, Jr., Granada Hills, both of Calif., assignors to Superspine, Inc., Poway, Calif.

Continuation-in-part of Ser. No. 9,369, Jan. 30, 1987, abandoned. This application Aug. 14, 1987, Ser. No. 86,314

Int. Cl.[5] A61H *1/02*

U.S. Cl. 128—25 R **27 Claims**



1. Apparatus to permit a person to perform coordinated motions of walking while maintaining his or her spine in an at least partially free of axial gravitational loaded state, which comprises:

a rigid frame including a generally flat platform at the top thereof, said platform having a surface to support said person from the hips superiorly in a supine position with at least reduced gravitational loading axially along said person's spine, said frame having a right side, a left side, an axial centerline, a shoulder end and a hip end, all corresponding to the location of the counterpart portions of said supported person's body;

a pair of leg supports, each support pivotally mounted to the hip end of said frame and pivotable in a vertical plane, one support disposed on the right side and one support disposed on the left side of said centerline;

a pair of arm exercisers, one disposed on the right side and one disposed on the left side of said centerline, the arm exercisers each consisting essentially of an elongated member positioned substantially perpendicular to the flat platform and having a handgrip disposed at one end thereof, the handgrip being adapted to be engaged by the hand of a person, said arm exercisers being adapted to move in a generally vertical plane and being positioned to maintain the person's natural wrist and elbow angle with the arms substantially unsupported while performing the motion of walking;

linkage means for joining said arm exercisers and leg supports to cause the right side arm exerciser and left side leg support to move vertically and synchronously in one direction and the left side arm exerciser and right side leg support to move vertically and synchronously in the other direction when said apparatus is activated; and

inertial means, connected to the linkage means for maintaining the synchronous opposed movement of said leg supports and arm exercisers for a period of time while said person remains in said supine position with said spine in said state of at least reduced axial loading.

4,986,262

MEASURING ENDOSCOPE

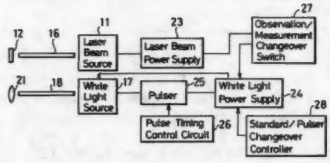
Satoshi Saito, Tochigi, Japan, assignor to Kabushiki Kaisha Toshiba, Kawasaki, Japan

Filed Mar. 31, 1988, Ser. No. 176,006

Claims priority, application Japan, Mar. 31, 1987, 62-76494; Apr. 30, 1987, 62-106921; Aug. 20, 1987, 62-205051

Int. Cl.[5] A61B *1/04*

U.S. Cl. 128—6 **11 Claims**



1. An endoscope for carrying out both measurements of the form of an object to be measured and ordinary observation of the object to be measured, comprising:

(a) first irradiation means for irradiating illumination light for observation onto the object to be measured in order to carry out the ordinary observation of the object;

(b) second irradiation means for irradiating a pattern projection light onto the object to be measured in order to carry out the measurement of the form of the object;

(c) image pickup means for picking up an image of the object to be measured which is irradiated by the illumination light for observation and/or the pattern projection light;

(d) means for detecting the form of the object in accordance with the image signals from said image pickup means, when the pattern projection light is irradiated onto the object; and

(e) irradiation timing control means for controlling said first and second irradiation means such that the pattern projection light is irradiated from said second irradiation means at least when the illumination light for observation is not irradiated from said first irradiation means.

4,986,263

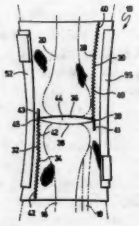
MUSCULOSKELETAL KNEE SUPPORT

Jeffrey P. Dickerson, Warsaw, and Scott Charlton, Silver Lake, both of Ind., assignors to Biomet, Inc., Warsaw, Ind.

Filed Apr. 23, 1990, Ser. No. 512,858

Int. Cl.[5] A61F *3/00, 5/00*

U.S. Cl. 128—80 C **15 Claims**



1. A musculoskeletal knee support adapted to be placed over

the human knee to support the knee during physical activity comprising:

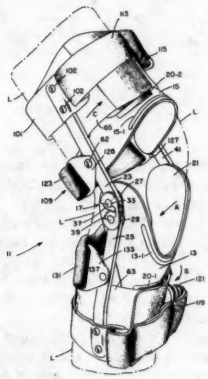
a multiple edge single piece of resilient flexible material having an top edge and a bottom edge being essentially parallel to one another, opposing upper edges and opposing lower edges angularly disposed with respect to said top and bottom edges, said opposing upper edges being laterally separated from said opposing lower edges by essentially horizontal edges, said single piece of material being formed into a generally cylindrical sleeve conforming generally to the shape of the knee and the lower thigh and upper calf adjacent the knee, said sleeve having a first stitched seam along said upper opposing edges at the upper half of said sleeve posterior to one side of the knee and a second stitched seam along said lower opposing edges at the lower half of the sleeve posterior of the other side of the knee and with a generally horizontal aperture between said horizontal edges positioned at the rear fold line of the skin at the back o the knee.

4,986,264

KNEE BRACE

Marion E. Miller, 4800 N. A-1-A unit 418, Vero Beach, Fla. 32963

Filed Sep. 29, 1989, Ser. No. 414,531
Int. Cl.[5] A61F *5/00*
U.S. Cl. 128—80 C **10 Claims**



1. A knee brace for providing anterior-posterior, medial-lateral and rotational stability of the knee of a person comprising:

a. a frame, said frame comprising a pair of mechanical joints, one of the mechanical joints being at the medial side of the leg and the other mechanical joint being at the lateral side of the leg, each one of said mechanical joints comprising an upper bar and a lower bar, each upper bar being pivotally interconnected to its associated lower bar,

b. an anterior tibial shell conforming to the shape of the lower leg pivotally mounted on the upper bars of the two mechanical joints,

c. an anterior femoral shell conforming to the shape of the thigh area of the leg pivotally mounted on the upper bars of the two mechanical joints above the anterior tibial shell, and

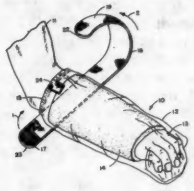
d. means for securing the thigh and lower leg respectively in the femoral and tibial shells, respectively.

4,986,265

PROTECTIVE COVER FOR CAST

Ronald E. Caponi, P.O. Box 409, Orlando, Fla. 32802

Continuation-in-part of Ser. No. 155,740, Feb. 16, 1988, abandoned. This application Jun. 8, 1989, Ser. No. 363,202
Int. Cl.[5] A61F *15/00*
U.S. Cl. 128—82 **4 Claims**



1. A protective cover for covering a cast on a patient comprising:

an elongated, waterproof, flexible, polymer bag having an opening on at least one end thereof, said open end having an elastic edge formed thereon to hold said elongated, waterproof, flexible, polymer bag over a cast on a patient and said elongated flexible polymer bag having a piece of hook and loop material attached thereto;

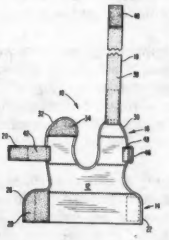
an elongated, substantially flat, sealing band, said elongated, substantially flat sealing band being made of an elastic, resilient, waterproof foamed polymer material having hook and loop material attached thereto with the hook material positioned at predetermined positions on one side of said flat sealing band and the loop material covering a substantial portion of the other side of the flat sealing band and said elongated substantially flat sealing band being long enough to form a plurality of overlapping loops around a patient's limb; whereby said elongated, waterproof, flexible, polymer bag can be placed over a cast and the said elongated, substantially flat, sealing band wrapped around the open end thereof to seal the open end against the intrusion of liquid, said elongated, substantially flat sealing band being held in stretched position by the hook and loop material.

4,986,266

HEMI-ARM SLING WITH ABDUCTION CONTROL STRAP

Peer Lindemann, 338 Lagoon Dr., Ozona, Fla. 34660

Filed Dec. 6, 1989, Ser. No. 447,012
Int. Cl.[5] A61F *5/40*
U.S. Cl. 128—94 **7 Claims**



1. A hemi-arm sling apparatus comprising:

a cuff including an adjustable arm engaging section and an adjustable shoulder engaging section attached to said

adjustable arm engaging section, said arm engaging section of said cuff including a first flap having a first mateable material thereon and a second flap having a second mateable material thereon for engagement with said first mateable material, said shoulder engaging section including a first flap having a first mateable material thereon and a second flap having a second mateable material thereon for engagement with said first mateable material;

a resilient chest strap having a first end attached to said cuff and a second end;

a ring attached to said cuff for engaging the second end of said resilient chest strap; and,

adjustable abduction control means attached at one end to said cuff and attachable at the other end to said chest strap, said abduction control means comprising a resilient strap and including a first mateable material thereon for engaging with a second mateable material on said chest strap,

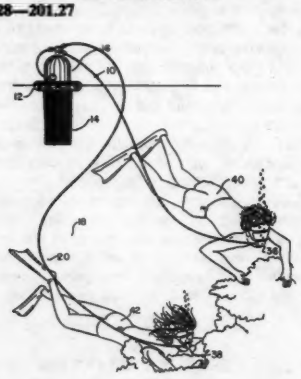
wherein one of said first and second mateable materials comprises a hook material and the other of said mateable materials comprises a loop material for engaging said hook material.

4,986,267

UNDERWATER BREATHING APPARATUS

Stephen F. Doss, 6508 Mockingbird Way, St. Petersburg, Fla. 33707

Filed Jul. 12, 1988, Ser. No. 217,666
Int. Cl.[5] A62B 7/02
U.S. Cl. 128—201.27 **1 Claim**



1. A new and improved underwater breathing apparatus comprising:

at least one compressed air supply cylinder;

compressed air supply support means, said support means including a bag into which said compressed air supply cylinder is positioned, said bag being of a mesh net construction;

float means for supporting said compressed air supply support means, said float means including a donut-shaped float, said support means being affixed to said float and being retained within a central opening portion thereof;

bag attachment means, said bag attachment means including a flexible line laced around said float and being attached to said bag;

cylinder restraining means connected to said float to positively restrain said cylinder in said bag with said float;

air delivery means for delivering air from said compressed air supply cylinder to a swimmer utilizing said breathing apparatus, said air delivery means including at least one extended length of hose designed to deliver air from said compressed air supply cylinder to a swimmer, said air delivery means further including a first stage regulator mounted to said compressed air supply cylinder, said at least one extended length of hose being attached to said first stage regulator, said air delivery means further including a second stage regulator attached to a remaining free end of said at least one extended length of hose;

first tether means for connecting said at least one extended length of hose to said float;

second tether means for connecting said at least one extended length of hose to a swimmer; and

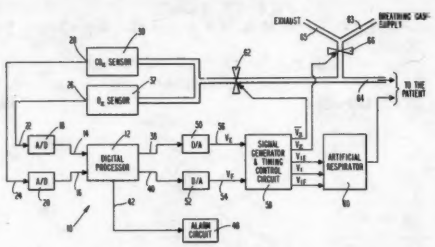
cylinder stabilizing means operable to retain said compressed air supply cylinder in a vertical position while being towed by a swimmer, said cylinder stabilizing means including a strap positionable around the mesh net log and the bottom portion of said compressed air supply cylinder and being operable to connect said at least one extended length of hose thereto.

4,986,268

METHOD AND APPARATUS FOR CONTROLLING AN ARTIFICIAL RESPIRATOR

Fleur T. Tehrani, 2601 Pennsylvania Ave., Apt. 947, Philadelphia, Pa. 19130

Continuation-in-part of Ser. No. 178,019, Apr. 6, 1988, abandoned. This application Aug. 18, 1988, Ser. No. 233,455
Int. Cl.[5] A61M 16/00
U.S. Cl. 128—204.22 **27 Claims**



16. In a respirator for varying tidal volume and frequency of breaths of a patient, a method of automatically controlling the respirator comprising the steps of:

(a) measuring levels of carbon dioxide and oxygen of the patient and providing a first pair of data signals indicative of the same;

(b) providing data indicative of at least the patient's lung elastance factor, air viscosity factor in the lungs and barometric pressure;

(c) determining from said first pair of data signals and from the data provided in step (b) the required ventilation and breathing frequency for a next breath of the patient and providing a second pair of data signals indicative of the same; and,

(d) providing, based upon said second pair of data signals, final data signals for automatically and variably controlling the ventilation and breathing frequency of the respirator based upon actual ventilation and breathing frequency requirements of the patient as determined in step (c).

4,986,269

RESPIRATION THERAPY APPARATUS

Taisto Hakkinen, Hameenlinna, Finland, assignor to Etela-Hameen Keuhkovammayhdistys R.Y., Finland

Continuation-in-part of Ser. No. 25,146, Jan. 15, 1987. This application Nov. 7, 1989, Ser. No. 432,540
Claims priority, application Finland, May 23, 1985, 852073
Int. Cl.[5] A61M 16/18
U.S. Cl. 128—204.23 **8 Claims**

1. Respiration therapy apparatus intended for individuals suffering from respiratory diseases, for indisposed individuals,

or for unconscious individuals, said respiration therapy apparatus being used as a respirator (IPPB) or as means for atomizing a drug or for dispensing air or oxygen, and said respiratory apparatus comprising

a control unit (14),

an oxygen or air supply pressure line (16) connected to said control unit (14),

a respirator (80),

a first and a second oxygen or air line by means of which said control unit is connected to said respirator (80),

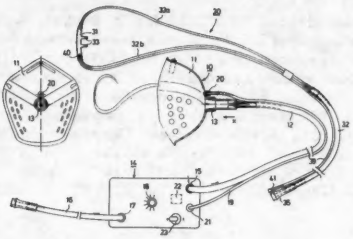
said respirator comprising a mouthpiece, an exhalation valve, a drug atomizer and an injector,

a pressure pick-up (22),

a separate connector leading from said pressure pick-up (22) to a flow of oxygen or air from said control unit (14) to said respirator (80),

valve means disposed in the flow of oxygen or air, said pressure pick-up (22) arranged to control opening and closing of said valve means,

whereby the flow of oxygen or air from said control unit (14) to said respirator (80) is controlled with the aid of said pressure pick-up (22), so that when inspiration of an individual is taking place, said pressure pick-up (22) senses change of pressure in inspirational oxygen or air caused by commencement of an inspirational phase, and said pressure pick-up is arranged to open said valve means by which a connection of said supply pressure line (16) to said control unit (14) is opened, and



at commencement of an exhalation phase, said valve means are adjusted by way of said pressure pick-up (22) to a position such that the connection to said supply pressure line (16) is closed,

said respiration therapy apparatus additionally comprising

timing means (94, 97) provided in said control unit (14) and arranged so that a signal or a control variable coming from said pressure pick-up (22) is arranged, counting from commencement of the inspirational phase, to start a count of said timing means (94, 97), with maximum time during which said valve means of said control unit (14) connected to said timing means (94, 97) is opened and admitting the air or oxygen flow from the control unit (14) to the respirator (80) being pre-set in said timing means (94, 97),

wherein said valve means comprises both a first valve (23) and a second valve (98), both of which are arranged to be controlled by said pressure pick-up (22), and

said second valve (98) is arranged to be controlled via electronics of said timing means (94, 97),

whereby connection from said pressure line (16) to said first line passing from the control unit (14) to said respirator (80) is opened and closed by way of said first valve (23), and connection from said pressure line (16) to said second line passing from said control unit (14) to said respirator (80) is opened and closed by way of said second valve (98),

so that one of the first valve or the second valve opens and closes said oxygen or air pressure line through which drug atomizing from said drug atomizer of said respirator is effected while an atomized drug is mixed with air or oxygen conducted along one of the first or the second oxygen or air lines, and

at commencement of the inspiration, said one of the first or the second oxygen or air lines is opened or controlled by said pressure pick-up (22) and, simultaneously time, said oxygen or air supply pressure line is opened or controlled by said pressure pick-up (22) via said timing means (94, 97) with a maximum time the drug is atomized being pre-set in said timing means (94, 97).

4,986,270

HEMODYNAMICALLY RESPONSIVE SYSTEM FOR AND METHOD OF TREATING A MALFUNCTIONING HEART

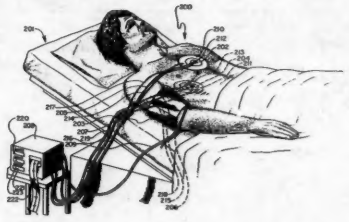
Todd J. Cohen, Mountain View, Calif., assignor to Leonard Bloom, Towson, Md., a part interest

Continuation-in-part of Ser. No. 233,367, Aug. 18, 1988, which is a continuation-in-part of Ser. No. 105,030, Oct. 6, 1987, Pat. No. 4,774,950. This application May 4, 1989, Ser. No. 347,450

The portion of the term of this patent subsequent to Oct. 4, 2005, has been disclaimed.

Int. Cl.[5] A61N *1/00*

U.S. Cl. 128—419 D **37 Claims**



1. In a system for treating a malfunctioning heart of the type which includes storage means for storing electrical energy, electrode means for electrically coupling the storage means to the heart, pressure responsive sensing means for sensing pressure within at least one vessel between the heart and at least one lung, means for providing a first signal representative of baseline pressure, means responsive to output from the sensing means for developing a second signal representing mean current pressure over a period of given duration, and means responsive to output from the means for providing the first signal and output from the means for developing the second signal for charging and enabling discharge of the electrical energy stored by the storage means across the electrode means upon change in the mean current pressure of at least a predetermined amount from the representative baseline pressure.

4,986,271

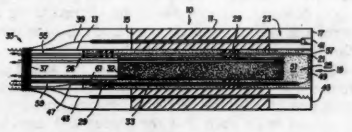
VIVO REFILLABLE GLUCOSE SENSOR

Ebtisam S. Wilkins. Albuquerque, N. Mex., assignor to The University of New Mexico, Albuquerque, N. Mex.

Filed Jul. 19, 1989, Ser. No. 382,603

Int. Cl.[5] A61B *5/00*

U.S. Cl. 128—635 **9 Claims**



5. An electrochemical sensor implantable for an extended

period of time in a living body for sensing one or more components of bodily fluids comprising:

a housing having membrane means for defining reaction chamber means into which said one or more components of the bodily fluid may enter via said membrane means;

charge flow means and discharge flow means coupled to said reaction chamber means for respectively admitting to and expelling from said reaction chamber means particulate matter containing an enzyme for chemically reacting with at least one of said components, and

electrode means in said reaction chamber means for producing electrical signals corresponding to the chemical reaction between the enzyme material and the component.

4,986,272

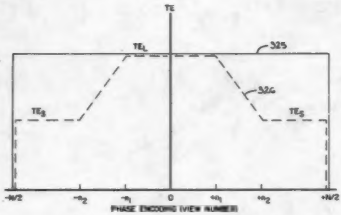
NMR IMAGING WITH VARIABLE REPETITION

Stephen J. Riederer, and Farhad Farzaneh, both of Rochester, Minn., assignors to Mayo Foundation For Medical Education and Research, Rochester, Minn.

Filed Aug. 9, 1989, Ser. No. 391,339

Int. Cl.[5] A61B 5/055

U.S. Cl. 128—653 A **8 Claims**



1. In a method for producing a set of NMR image data that is acquired by repeating a pulse sequence in which an NMR echo signal is acquired following the application of a first RF excitation pulse, and in which a phase encoding gradient pulse is produced in each pulse sequence and is stepped through a set of discrete values as the pulse sequence is repeated, the improvement therein comprising;

altering the pulse sequence as the NMR data set is acquired by changing the time interval therein between the application of the first RF excitation pulse and the acquisition of the NMR echo signal as a varying function of the phase encoding gradient pulse value.

4,986,273

METHOD OF RADIOLOGICALLY SCANNING THE SPINE FOR MEASURING BONE DENSITY

William O'Neill, Ann Arbor, Mich., and James R. Warne, Washington, Pa., assignors to Medical & Scientific Enterprises, Inc., Sudbury, Mass.

Filed Aug. 7, 1989, Ser. No. 391,387

Int. Cl.[5] A61B 6/00

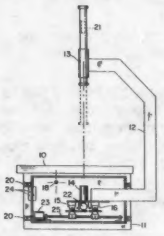
U.S. Cl. 128—653 R **13 Claims**

1. A method of measuring bone density in the spine comprising:

scanning a region of a spinal column at a first angle with a scanning assembly having a dual energy radiation source and a detector, the detector being aligned along an alignment axis with the source to receive radiation transmitted through the region from the source during scanning of the source and detector along an axis of the spinal column;

rotating the radiation source and detector, which are mounted on a rotable platform, about a horizontal axis to a second angle such that the source and detector alignment axis extends laterally through the spinal region at an angle different from the first angle;

scanning a region of the spinal column with the scanning assembly to measure radiation from the source that is transmitted laterally through and region to the detector at the second angle; and



determining the density of bone within the spinal region from radiation received by the detector during scanning at the first and second angles.

4,986,274

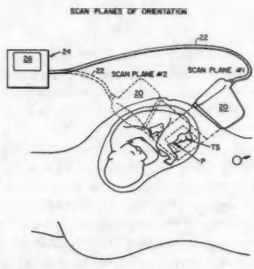
FETAL ANATOMIC SEX ASSIGNMENT BY ULTRASONOGRAPHY DURING EARLY PREGNANCY

John D. Stephens, 14171 Stanford Ct., Los Altos Hills, Calif. 94022

Continuation of Ser. No. 372,234, Jun. 26, 1989, abandoned, and a continuation of Ser. No. 282,824, Dec. 7, 1988, abandoned, which is a continuation of Ser. No. 65,128, Jun. 19, 1987, abandoned, which is a continuation of Ser. No. 914,568, Oct. 2, 1986, abandoned, which is a continuation of Ser. No. 825,781, Feb. 3, 1986, abandoned, which is a continuation of Ser. No. 662,877, Oct. 19, 1984, abandoned. This application Dec. 4, 1989, Ser. No. 453,123

Int. Cl.[5] A61B 8/14

U.S. Cl. 128—660.07 **20 Claims**



1. A method for assigning the anatomic sex of a fetus during the twelfth week to the fourteenth week of pregnancy, comprising the steps of:

ultrasonically imaging the genital area of the fetus during the twelfth week to the fourteenth week of pregnancy in a transverse ultrasonic scan plane;

diagnosing a male fetus by identifying the male external genitalia as a two component structure comprised of a bright single echo which represents the penis and two less bright echoes sideby-side, visualized at a distance from the penis, which represent the fused labio-scrotal folds and evidence the early formation of the testicle sac; and

diagnosing a female fetus by identifying the female external genitalia as a three component structure comprised of a rectangular echo located between two parallel linear echoes.

4,986,275

ULTRASONIC THERAPY APPARATUS

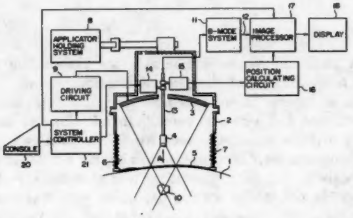
Akinori Ishida; Satoshi Aida, both of Kawasaki, and Nobuyuki Iwama, Tokyo, all of Japan, assignors to Kabushiki Kaisha Toshiba, Kawasaki, Japan

Continuation of Ser. No. 228,444, Aug. 5, 1988, abandoned. This application Aug. 9, 1989, Ser. No. 391,402

Claims priority, application Japan, Aug. 5, 1987, 62-194452; Sep. 30, 1987, 62-249036

Int. Cl.[5] A61B *8/14, 17/22*

U.S. Cl. 128—660.03 14 Claims



1. An ultrasonic therapy apparatus comprising:

a treating ultrasonic transducer for generating a treating ultrasonic wave focused at a predetermined focal point in a body of an object to be examined;

driving means for intermittently driving said treating ultrasonic transducer to generate the treating ultrasonic wave;

an imaging ultrasonic transducer, movably arranged, for transmitting and receiving an imaging ultrasonic wave so as to obtain a tomographic image of the object to be examined;

tomographic image forming means for driving said imaging ultrasonic transducer to transmit the imaging ultrasonic wave and forming a tomographic image of the object to be examined based on an ultrasonic echo signal received by said imaging ultrasonic transducer; and

position control means for cyclically moving said imaging ultrasonic transducer in association with said driving means between a first position near the body and a second position apart from the body along a line connecting a central point of said treating transducer and the focal point of the treating ultrasonic wave, the treating ultrasonic wave being generated when the image ultrasonic transducer is in the second position.

4,986,276

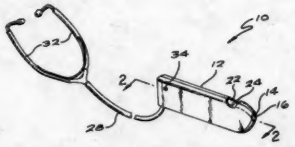
FLOW DETECTOR

Terry Wright, 11023 118th Pl. NE., Kirkland, Wash. 98034

Filed May 22, 1989, Ser. No. 355,692

Int. Cl.[5] A61B *8/00*

U.S. Cl. 128—662.04 36 Claims



1. An ultrasonic, transcutaneous blood flow detector for detecting the blood flow in a patient's body, comprising:

a transducer mounting member having an exterior face positionable against the skin of the patient for the transfer of ultrasonic energy into and out of the patient's body, and an opposite interior face;

a single piezoelectric transducer having a first face in juxtaposition with said mounting member interior face, and an opposite second face, said transducer being movable laterally and axially relative to said mounting member within at least a range sufficient to permit substantially uninhibited deformation of said transducer in response to an electrical drive signal applied thereto and received ultrasonic acoustic energy reflected from within the patient's body;

a film of viscous semifluid material positioned between said transducer first face and said mounting member interior face to couple ultrasonic energy between said transducer and said mounting member;

a resilient member resiliently biasing said transducer first face into engagement with said mounting member interior face and said film of viscous semifluid material therebetween;

transmitter means connected to said transducer for supplying said drive signal to said transducer, said drive signal being a continuous wave excitation signal causing said transducer to continuously transmit an acoustic output signal at a desired transmitted ultrasonic frequency;

detector means connected to said transducer and operating concurrently with said transmitter means for detecting a Doppler frequency shifted electrical signal generated by said transducer as a result of Doppler frequency shifted acoustic energy reflected back to said transducer from within the patient's body indicative of blood flow, and for generating a detector signal in response thereto indicative of the velocity changes of the detected blood flow; and

output means connected to said detector means for providing an output signal to the user responsive to said detector signal to indicate to the user the detected blood flow, whereby the blood flow detector operates with a single transducer continuously transmitting said acoustic output signal while concurrently detecting any Doppler frequency shifted acoustic energy reflected back to said transducer, with said transmitted acoustic output signal and said Doppler frequency shifted acoustic reflected energy traveling along the same path between said transducer and the area of reflection within the patient's body.

4,986,277

METHOD AND APPARATUS FOR NON-INVASIVE MONITORING OF CENTRAL VENOUS PRESSURE

Marvin A. Sackner, 300 W. Rivo Alto Dr., Miami Beach, Fla. 33139

Filed Aug. 24, 1988, Ser. No. 235,672

Int. Cl.[5] A61B *5/02*

U.S. Cl. 128—672 76 Claims

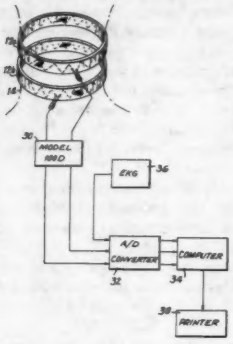
1. A method for measuring CVP comprising:

disposing a transducer on the neck of a subject;

processing the signal from the transducer to obtain the cardiac component; and

adjusting the vertical distance from the transducer to a

reference level until a position is located at which the signal transitions between a venous configuration and an



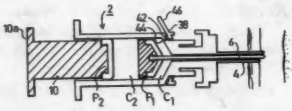
arterial or mixed venous-arterial configuration, at which position said vertical distance approximates CVP.

4,986,278

BIOPSY SYRINGE DEVICE

Mordechai Ravid, Rekanti 3, Tel Aviv; Dan Kedem, Weizman 43, Rehovot 76283, and Uzi Kedem, Gan Haim 44910, Israel

Filed Dec. 18, 1989, Ser. No. 452,078
Claims priority, application Israel, Jan. 13, 1989, 88947
Int. Cl.[5] A61B *10/00*
U.S. Cl. 128—753 **17 Claims**



1. A device particularly useful as a biopsy syringe for removing a specimen from a subject, comprising:

a tubular housing;

a long hollow needle extending from one end of said housing;

a first piston within said housing and defining a first chamber with said one end of the housing; said first piston carrying a mandrel received in the hollow needle and having an outer diameter substantially equal to the inner diameter of the hollow needle; said first piston being movable within said housing to either an extended position contracting said first chamber and locating the tip of said mandrel at or outwardly of the tip of said hollow needle, or to a retracted position expanding said first chamber and spacing the tip of said mandrel inwardly from the tip of said hollow needle;

a second piston within said housing between the opposite end thereof and said first piston and defining a second chamber therewith; said second piston being movable either to an extended position adjacent said first piston when in its extended position and thereby contracting said second chamber, or to a retracted position spaced away from said first piston when in its extended position and thereby expanding said second chamber to create a vacuum therein;

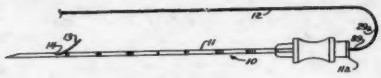
and controllable venting means for venting said first chamber to the atmosphere.

4,986,279

LOCALIZATION NEEDLE ASSEMBLY WITH REINFORCED NEEDLE ASSEMBLY

William J. O'Neill, Gainesville, Fla., assignor to National-Standard Company, Niles, Mich.

Filed Mar. 1, 1989, Ser. No. 317,607
Int. Cl.[5] A61B *10/00*
U.S. Cl. 128—754 **28 Claims**



1. A localization needle assembly for pinpointing lesions within body tissue, including in combination:

an outer tubular cannula member having a distal end and a proximal end with said cannula member having an opening predeterminedly located from said distal end,

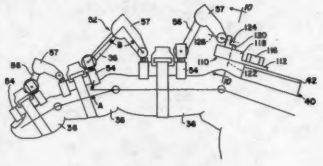
an elongated inner needle structure having a distal end and a proximal end, with a linear portion at its distal end and a flexible reinforced portion extending proximal from said linear portion towards its proximal end, said needle structure comprising an elongated wire core means and said flexible reinforced portion comprising multiple wire strands wound on said wire core means over a portion of its length, said reinforced potion terminating short of the distal end of said wire needle structure, defining said linear portion of said wire needle structure, said linear portion of said needle structure having anchoring means including an extendable and retractable barb, said inner needle structure being slidably mounted for movement within said outer cannula member between a first position and a second position, said barb being contained within said outer cannula member, extending towards said opening in said outer cannula member when said needle structure is in said first position and said barb being moved outward of said outer cannula member through said opening predeterminedly located from the distal end of said outer cannula member to engage body tissue when said needle structure is moved to said second position to anchor the localization needle assembly to body tissue.

4,986,280

HAND POSITION/MEASUREMENT CONTROL SYSTEM

Beth Marcus, Lexington; W. Thompson Lawrence, Bedford, and Philip Churchill, Arlington, all of Mass., assignors to Arthur D. Little, Inc., Cambridge, Mass.

Filed Jul. 20, 1988, Ser. No. 222,092
Int. Cl.[5] A61B *5/103*
U.S. Cl. 128—774 **22 Claims**



1. A system for use in sensing the relative angular orientation of at least two movable adjacent skeletal link segments of a living body joined together at a joint, said system comprising:

first and second links coupled together about a first pivot axis so that said links are pivotable relative to one another about said axis so as to define a variable angle between said links about said first pivot axis;

securing means for securing said first and second links rela-

tive to said skeletal link segments so that said links pivot about said first pivot axis when said skeletal link segments pivot about said joint, wherein said securing means includes an attachment assembly for attaching said links to each of said skeletal link segments so that said links pivot relative to said attachment assembly about two degrees of freedom and follow the relative angular movement of the skeletal link segments with reduced artifacts due to motion between said attachment assembly and said skeletal link segments; and

sensor means for sensing said angle between said skeletal link segments.

4,986,281

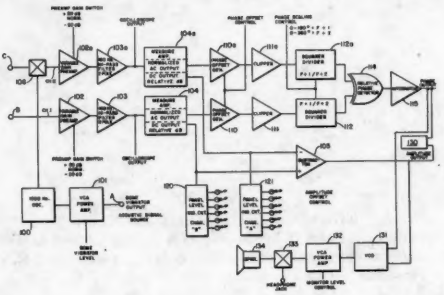
METHOD FOR OBTAINING A SIGNAL FOR ANALYZING HUMAN AND ANIMAL JOINT FUNCTIONS

David A. Preves, Edina; Brian P. Rosengren, Eden Prairie; James E. Holte, Minneapolis, and Myer S. Leonard, Golden Valley, all of Minn., assignors to Starkey Laboratories, Inc., Eden Prairie, Minn.

Continuation of Ser. No. 643,848, Aug. 23, 1984, abandoned. This application Jan. 12, 1990, Ser. No. 469,756

Int. Cl.[5] A61B 5/11

U.S. Cl. 128—782 **4 Claims**



1. A non-invasive method for obtaining a signal to be used for analyzing functions of human and animal joints which comprises:

producing a sinusoidal vibrational first signal having a signal predetermined frequency with measurable phase and amplitude characteristics,

transmitting the first signal through the joint to be analyzed,

moving the joint through a series of positions during such transmission to produce a modulated signal,

detecting at least one of the characteristics of the modulated signal after the transmitted signal has passed through the joint during opening and closing thereof,

presenting for analysis the detected modulated signal,

and detecting the transmitted signal without passing the same through the articulated joint and differencing the second detected signal from the first detected signal to produce a resultant signal modulated solely by the transmission of the signal through the articulated joint.

4,986,282

FACE SHIELD SYSTEM

Wyman H. Stackhouse, 3201 Poinsettia Ave., Manhattan Beach, Calif. 90266, and Ian M. Williamson, 555 N. Harbor Dr., Redondo Beach, Calif. 90277

Filed Sep. 9, 1987, Ser. No. 94,712

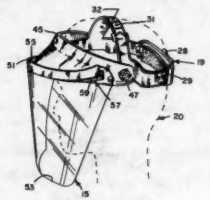
Int. Cl.[5] A61F 11/00, 9/00; A42B 1/06

U.S. Cl. 128—857 **4 Claims**

1. A face shield system for protection of health care workers from accidental exposure to the body fluids from virus infected patients, comprising:

a support member adjustably sized and shaped to fit the head of the user and including a generally horizontal head band and an upper cross band section as an integral part of said support member;

a curved face shield having an upper peripheral portion conformable generally to the curved lower peripheral portion of said support member and extending therebelow to protect the user's face from splashed fluids when said face shield is in its normal generally vertical position; and



a hook and pile engaging and holding means disposed on the outer surface of said lower peripheral portion of said support member and on the inner surface of said upper peripheral portion of said face shield for frictionally engaging and holding said face shield to said support member thereby providing a quick release mechanism for separating said face shield from said support member.

4,986,283

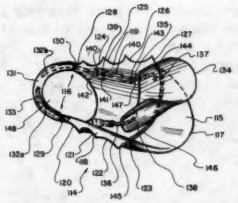
ORAL APPLIANCE FOR TONGUE THRUST CORRECTION

Harry W. Tepper, 535 Ocean Ave., #2B, Santa Monica, Calif. 90402

Filed May 8, 1989, Ser. No. 348,561

Int. Cl.[5] A61F 5/56

U.S. Cl. 128—859 **7 Claims**



1. An oral appliance comprising a molded palatal portion having anterior and posterior ends, the palatal portion having sides extending between the anterior and posterior ends, the sides being in contact with and conforming to the contour of the surface of the teeth with which the respective sides are in contact; a thin wire filament arched between and secured to the sides at the anterior end and registrable against the lingual surfaces of the upper anterior teeth; a rubber sleeve encasing the filament along the length thereof; resilient band means attached to the palatal portion and spanning across the palatal portion between the sides thereof; and a lingual portion pivotable about at least one pivot point defined in the palatal portion, the lingual portion being in contact with the resilient band means for urging the lingual portion away from the palatal portion about the at least one pivot point.

4,986,284

CIGARETTE MANUFACTURE

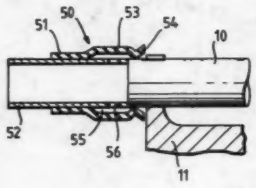
Michael J. Cahill; John Dawson, both of Coventry, and Brian H. Warner, Bucks, all of England, assignors to Molins PLC, London, England

Filed Feb. 3, 1989, Ser. No. 305,553

Claims priority, application United Kingdom, Feb. 10, 1988, 8802975; Oct. 11, 1988, 8823821

Int. Cl.[5] A24C 5/60

U.S. Cl. 131—88 13 Claims



1. Apparatus for introducing a liquid ingredient into the ends of cigarettes, comprising means for conveying cigarettes sideways through a treatment station in which a quantity of the liquid ingredient is transferred to the end of each cigarette, a source of suction, means for carrying a series of flexible tubular sealing members so that each of said sealing members is aligned with a representative cigarette in the treatment station, and means for moving each sealing member into engagement with a respective cigarette and for connecting each sealing member to the source of suction, each sealing member being so shaped that an end portion thereof can extend over and engage around the end portion of the corresponding cigarette at a position spaced inwardly from the end face of the cigarette, and being sufficiently flexible that suction transmitted through the sealing member causes the end portion of the sealing member to contract and thus grip the cigarette at said inwardly spaced position on the cigarette.

4,986,285

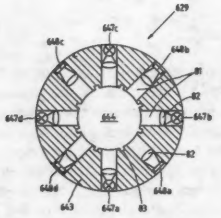
METHOD AND APPARATUS FOR ASCERTAINING THE DENSITY OF WRAPPED TOBACCO FILLERS AND THE LIKE

Andrzej Radzio, Quinton, Va., and Wolfgang Stems, Hamburg, Fed. Rep. of Germany, assignors to Körber AG, Hamburg, Fed. Rep. of Germany

Continuation of Ser. No. 837,096, Mar. 6, 1986, Pat. No. 4,805,641, and a continuation-in-part of Ser. No. 760,995, Jul. 31, 1985. This application Dec. 2, 1988, Ser. No. 279,407

Int. Cl.[5] A24C 5/14, 5/34

U.S. Cl. 131—280 2 Claims



1. Apparatus for ascertaining the density of an elongated body of fibrous material, comprising a source of electromagnetic radiation with a wavelength in one of the ultraviolet, visible and infrared ranges of the spectrum including means for directing at least one beam of such radiation into the body of fibrous material in at least on predetermined direction at least substantially at right angles to the longitudinal direction of the elongated body so that the beam penetrates through at least a portion of the body and at least one of its characteristics is influenced by the density of the body, at least some of the radiation being reflected and scattered by the fibrous material of the body so that the direction of propagation of reflected and scattered radiation departs form said at least one predetermined direction and such reflected and scattered radiation emerges from the body in at least one second direction other than said at least one predetermined direction; and means for monitoring the characteristic of at least some of the scattered and reflected radiation subsequent to its emergence from the body of fibrous material in said at least one second direction, said monitoring means being oriented to monitor radiation which is scattered and reflected substantially transversely of said at least one predetermined direction and substantially at right angles to the longitudinal direction of said elongated body, said monitoring means including means for generating a signal which is indicative of the monitored characteristic of the radiation.

4,986,286

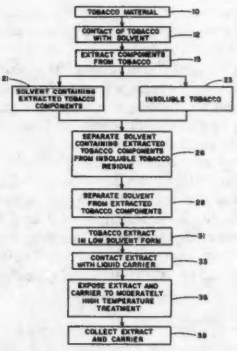
TOBACCO TREATMENT PROCESS

Donald L. Roberts, Winston-Salem, N.C., and Carmen C. Fernandez, Palmerston North, New Zealand, assignors to R. J. Reynolds Tobacco Company, Winston-Salem, N.C.

Filed May 2, 1989, Ser. No. 346,042

Int. Cl.[5] A24B 15/18

U.S. Cl. 131—290 20 Claims



1. A process for providing flavorful tobacco substances, the process comprising:

(a) providing a tobacco composition including a tobacco extract carried by a substrate, and

(b) subjecting the tobacco composition to heat treatment by exposure to a temperature above about 150° C. and within a temperature exposure index of about 200 to about 600 min.°C./g.

4,986,287

COAXIAL CIGARETTE

Werner Schneider, Quickborn; Horst Borowski, Hamburg; Erwin Kausch; Rolf Kütting, both of Jesteburg; Meinhard Meyer, Appen-Unterglinde; Knut Möller; Bernd-Henrik Müller, both of Hamburg, and Adolf Schlüter, Quickborn, all of Fed. Rep. of Germany, assignors to B.A.T. Cigarettenfabriken GmbH, Hamburg, Fed. Rep. of Germany

Filed Oct. 18, 1989, Ser. No. 423,310

Claims priority, application Fed. Rep. of Germany, Oct. 24, 1988, 3836210

Int. Cl.[5] A24D *1/00, 1/02, 1/18*

U.S. Cl. 131—360 15 Claims

1. A coaxial cigarette comprising

(a) an inner core of a material burning substantially free of residue,

(b) a sheath for the inner core,

(c) an outer jacket of a tobacco and/or non-tobacco material coaxially surrounding the inner core or the sheath thereof and

(d) a sheath for the outer jacket, wherein

(e) the diameter of the inner core lies in the range from 45% to 80% of the outer diameter of the coaxial cigarette;

(f) the inner core has a packing density in the range from 300 to 400 mg/cm^3;

(g) the sheath of the inner core has an air permeability of less than 3 ISO units;

(h) the outer jacket has a packing density in the range from 170 to 250 mg/cm^3;

(i) the outer sheath comprises a front segment to be ignited and a rear mouth-side segment;

(j) the front ignition-side segment of the outer sheath contains glow salts and has an air permeability of 15 to 40 ISO units; and

(k) the rear mouth-side segment of the outer sheath contains no glow salts and has an air permeability of less than 3 ISO units.

4,986,288

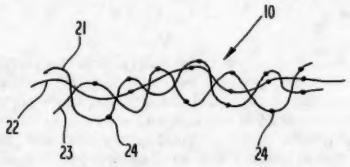
DENTAL FLOSS AND PICKS

Steven Kent, Heaton Norris; Sheila Downie, Stretford, and Paul Slater, Marple, all of England, assignors to Colgate-Palmolive Company, Piscataway, N.J.

Filed Mar. 23, 1988, Ser. No. 172,034

Int. Cl.[5] A61C *15/00*

U.S. Cl. 132—321 3 Claims



1. A dental floss made by the process comprising the following steps:

applying a coating incorporating a dental agent on a first filament;

applying a coating incorporating a dental agent on a second filament; and

intertwining said first and second filaments after applying said coatings.

4,986,289

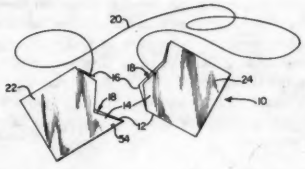
PACKAGED PRE-CUT DENTAL FLOSS PRODUCT

Charles E. McWhorter, 17130 Saddlewood Rd., Monument, Colo. 80132

Filed Nov. 4, 1986, Ser. No. 927,046

Int. Cl.[5] A61C *15/00*

U.S. Cl. 132—323 16 Claims



1. A dental hygiene product, comprising:

a substantially flat packet having a flat front panel and a flat back panel each formed of a flexible material and secured together along a common perimeter to define an enclosure having an interior, said packet being severable into first and second packet portions;

a layer of tacky material disposed on a portion of an interior surface of one of said front and back panels; and

a thread of dental floss stored within the interior of said packet, said thread having a first end secured to said first packet portion and a second end secured to said second packet portion so that, when said packet is severed into said first and second packet portions, the enclosure is ruptured whereby said thread may be withdrawn, said first and second packet portions defining first and second tabs, respectively, adapted to facilitate manual gripping of the first and second ends of the thread, said tacky material operative to initially adhere said thread in a selected configuration on the interior surface of the associated said one panel.

4,986,290

CLEANING DEVICE FOR CONTACT LENS

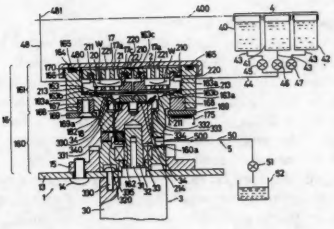
Tomio Oguma, Anjo, and Masashi Kai, Tokyo, both of Japan, assignors to Aisin Seiki Kabushiki Kaisha, Kariya, Japan

Filed May 31, 1989, Ser. No. 359,700

Claims priority, application Japan, May 31, 1988, 63-134111; Jun. 21, 1988, 63-152954; Jun. 22, 1988, 63-154050

Int. Cl.[5] B08B *3/04, 11/02*

U.S. Cl. 134—95 4 Claims



1. A cleaning device for a contact lens, comprising:

a housing having a cleaning chamber;

feeding means connected to said housing for separately feeding at least a cleaning liquid and another liquid into said cleaning chamber;

drain means in said housing and separate from said feeding means for draining said cleaning chamber;

a lens receiving container fittable in said cleaning chamber, said lens receiving container having a plurality of apertures positioned for permitting a liquid to freely enter and exit said container;

stirring means comprising motor driven stirring wings in said cleaning chamber for generating a rapid flow of a liquid in said cleaning chamber; and

an apertured receiving plate in said cleaning chamber, wherein said receiving plate has means for fixedly holding a lens receiving container positioned in said cleaning chamber such that apertures of said receiving plate are aligned with at least some of said apertures of said lens receiving container,

whereby said liquid may pass through said apertures and flow past a lens in said lens receiving container to clean said lens.

4,986,291

APPARATUS AND PROCESS FOR THE SURFACE TREATMENT OF STRIPS WITH LIQUIDS

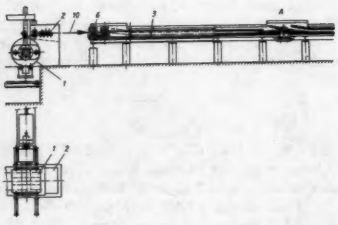
Emil Hula, Giesshubel, and Johann Deyer, Bruck both of Austria, assignors to Maschinenfabrik Andritz Actiengesellschaft, Austria

PCT No. PCT/AT87/00005, § 371 Date Jul. 22, 1988, § 102(e) Date Jul. 22, 1988, PCT Pub. No. WO88/05832, PCT Pub. Date Aug. 11, 1988

PCT Filed Feb. 5, 1987, Ser. No. 243,031

Int. Cl.[5] B08B *3/04*

U.S. Cl. 134—122 R **35 Claims**



35. Apparatus for pickling a rolled metal strip, said apparatus comprising:

a pickling vessel;

means for covering the vessel;

successive guide-beams located within the vessel above the strip as the strip is guided through the vessel, said guide beams are formed of wear resistant material, said guide-beams having an underside, formed on said underside and on a side from which the strip enters the vessel are saw-tooth-like profiles which are inclined towards a direction of movement of the strip;

carriages disposed on the vessel to travel transversely to the direction of movement of the strip, said carriages coupled to be driven in conjunction with one another;

plates made of wear resistant material connected to said carriages, the plates and carriages combining to act as adjustable lateral guides as the strip moves through the vessel.

4,986,292

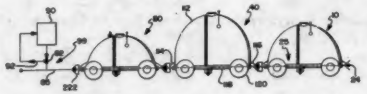
BULK STORAGE AND HANDLING SYSTEM

Theodore R. Rieple, Farmington Hills, assignor to Diversey Corporation, Mississauga, Canada

Filed Apr. 19, 1989, Ser. No. 340,515

Int. Cl.[5] B65D *88/54*

U.S. Cl. 134—166 R **13 Claims**



1. A tank car for storing and transporting a fluid, comprising:

(a) a hollow tank body having an inlet and an outlet, the tank body being fillable through the inlet;

(b) a support frame having a plurality of wheels for movement thereof, the tank body being mounted on the frame;

(c) a male fitting attached to the tank body;

(d) a female fitting on the tank body in fluid communication with the inlet or the outlet and disposed substantially opposite the male fitting, the male fitting being sealingly connectable to a female fitting of a substantially similar second car to allow fluid flow therebetween; and

(e) means for limiting fluid flow between tank cars to a single direction.

4,986,293

CLEANING SYSTEM

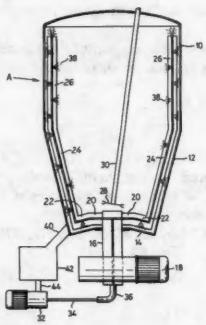
Peter Schertenleib, Reliau, Fed. Rep. of Germany, assignor to Netzsch Mastermix Limited, Aldrige, United Kingdom

Filed Oct. 25, 1988, Ser. No. 262,330

Claims priority, application United Kingdom, Oct. 27, 1987, 8725145

Int. Cl.[5] B08B *3/02*

U.S. Cl. 134—168 R **3 Claims**



1. A mixing apparatus comprising: a vessel for containing a body of solvent, having a base and side-wall; a slow speed stirring paddle in the vessel and including blade portions located closely adjacent said side-wall and base; a shaft supporting said paddle; means for rotating said shaft and paddle at slow speed; at least one high speed agitator paddle mounted on a further shaft or shafts extending into said vessel; a passageway extending through said slow speed stirring paddle and said shaft supporting said paddle; a plurality of jet outlets from said passageway; pump means; a reservoir for cleaning fluid located externally of said vessel; a flow path opening from a lowest point in said vessel, extending to said shaft passageway, and including said reservoir and said pump; a rotary joint between

said shaft passageway and said flow path; said cleaning fluid being pumped form the reservoir along the fluid path, through the shaft and passageway through the paddle to emerge from the jet outlets and be directed against side-wall and base while said shaft is rotated, so as to clean the side-wall and base, said cleaning fluid draining from the lowest point of said vessel to return to said flow path.

4,986,294

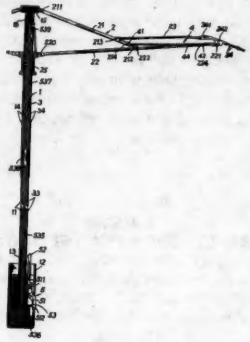
AUTOMATIC UMBRELLA HAVING SMOOTHLY-OPERATING SPRINGS

Tsun-Zong Wu, No. 16, Chen Tai Road, Sec. 3, Wu-Ku Itsiang, Taipei Hsien, Taiwan 24801

Continuation-in-part of Ser. No. 425,463, Oct. 23, 1989, Pat. No. 4,941,494. This application Jun. 18, 1990, Ser. No. 539,430

Int. Cl.[5] A45B *25/14*

U.S. Cl. 135—22 **5 Claims**



1. An automatic umbrella comprising:

a central shaft means including a lower tubular shaft, a grip fixed on a lower portion of said lower tubular shaft, a sleeve inserted in said lower shaft, an upper tubular shaft telescopically mounted on said lower tubular shaft, and an upper notch formed on an upper portion of said upper shaft;

a rib assembly for securing an umbrella cloth thereon including a first top rib having an inner end portion of said first top rib pivotally secured to said upper notch and having an outermost end portion of said first top rib secured to a middle portion of a stretcher rib having an inner end portion of said stretcher rib pivotally secured to a runner slidably encompassed on said upper shaft and second top rib pivotally secured between said first top rib and an innermost end portion of a third top rib, said stretcher rib having an outermost end portion pivotally secured to an inner end portion of said third top rib approximate to said innermost end portion of said third top rib, said stretcher rib formed with a longitudinal groove defined between two longitudinal side walls having across section of U shape;

an extending spring formed as an elongate coil spring retained in said central shaft means having a lower end of said extending spring retained on an upper end of said sleeve and having an upper end of said extending spring retained on an inner block secured to said upper notch inside said upper shaft, said extending spring having a length when releasing its elastic force upon an extension of said central shaft means generally equal to a length of extended central shaft means;

at least a retraction restoring spring secured between an outer end portion of said first top rib and an outer end portion of said stretcher rib normally urging said rib assembly downwardly inwardly towards said central shaft means for closing the umbrella; and

a control means including a seesaw button seesawly formed in said grip and selectively actuating an extension controller formed in an upper portion of said grip for extending said shaft means and opening the umbrella, or actuating a retraction controller generally formed in a lower portion of said grip and inside said shaft means for closing the umbrella;

the improvement which comprises:

said retraction restoring spring having a contraction spring portion formed on an outer spring end between an outermost spring end of said restoring spring and a middle spring portion of said restoring spring;

said stretcher rib having a concavely depressed portion formed on an outer portion of said stretcher rib approximate to said outermost end portion of said stretcher rib by pressing the two side walls of the stretcher rib inwardly;

said contraction spring portion of said restoring spring engageable with said concavely depressed portion of said stretcher rib for slidably holding an outer spring portion between the middle spring portion and the outermost end portion of the restoring spring in the longitudinal groove of said stretcher rib having a cross section of U shape for tangentially developing the spring force of the restoring spring.

4,986,295

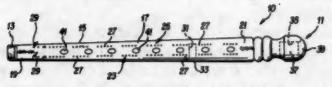
COMBINATION CANE AND CRIBBAGE BOARD

Thomas D. Kellner, 7115 Spring Hill Drive, Spring Hill, Fla. 34606

Filed Apr. 19, 1989, Ser. No. 340,519

Int. Cl.[5] A45B *3/00*

U.S. Cl. 135—66 **7 Claims**



1. In a cane having a handle portion, a tip portion designed to grip a ground surface and an elongated shaft therebetween tapering from a larger diameter adjacent said handle portion to a smaller diameter adjacent said tip portion, the improvement comprising a cribbage scoring board including a plurality of parallel lines of holes formed exteriorly on said cane and a stabilizing means for stabilizing said cane while said board is in use, said stabilizing means further comprising feet on said cane on a face opposed to said board, which feet prevent rolling of said cane.

4,986,296

METHOD AND APPARATUS FOR CHLORINATING WATER WITH LIQUEFIED CHLORINE

Walton B. Jones, Richboro, and Richard C. Elterich, Bethlehem, both of Pa., assignors to Capital Controls Company, Inc., Colmar, Pa.

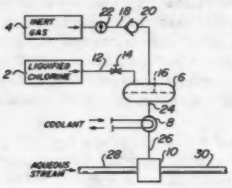
Filed Mar. 22, 1990, Ser. No. 497,181

Int. Cl.[5] F17C *7/02*

U.S. Cl. 137—3 **21 Claims**

8. A method for introducing a liquefied gas having a vapor pressure substantially in excess of atmospheric pressure into a liquid stream whose temperature is higher than the boiling point of said liquefied gas at the pressure of the liquid stream

comprising cooling said liquefied gas to a temperature below the boiling point of said liquefied gas at the pressure of said

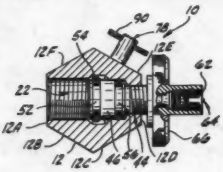


liquid stream and injecting said cooled liquefied gas into said liquid stream.

4,986,297
VALVE

Paul F. Ross, II, St. Louis, Mo., assignor to Control Devices, Inc., St. Louis, Mo.

Filed Feb. 23, 1990, Ser. No. 483,936
Int. Cl.[5] F16K *11/10, 31/50, 41/00*
U.S. Cl. 137—15 **5 Claims**



3. A method of assembling a valve for controlling flow of air from a source of air under pressure such as a compressed air tank comprising the steps of,

providing an elongate body having first and second ends and first and second sides lying opposite one another,

providing a valve stem having a head of circular cross section, a first resiliently compressible O-ring generally at one end of the head and a second resiliently compressible O-ring at the opposite end of the head, and a threaded extension extending from the head,

providing a knob adapted to be fitted on said valve head extension,

providing as by boring a transverse opening extending between the said first and second sides of said valve body adjacent its first end, said transverse opening having a first section of circular cross section extending inwardly from said first side, a second section of circular cross section coaxial with said first section at the inner end of said first section of smaller diameter than said first section, a third section of circular cross section of larger diameter than said second section coaxial with said first and second sections adjacent the second section, a fourth section of circular cross section of smaller diameter than said second section coaxial with said first, second and third sections adjacent said third section, and a fifth section of circular cross section of smaller diameter than said fourth section coaxial with said first, second, third and fourth sections, said body further having a longitudinal passage therein extending from its said second end to said third section of said transverse opening,

said second section of said transverse opening being defined by a radially inwardly extending annular formation having a first annular surface facing toward said first section and a second annular surface facing toward said third section, said annular surfaces converging radially inwardly toward one another, said second surface continuing into said third section and forming an annular valve seat,

inserting the valve stem into said transverse opening from said first side of the body with said valve head extension entering said transverse opening first, said second O-ring passing from said first section of said transverse opening through said second section and into said third section, said second O-ring resiliently compressing upon engagement with said first annular surface of said second section for squeezing said second O-ring through said second section,

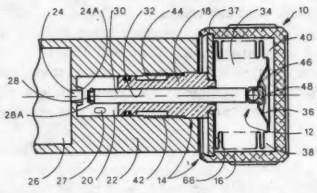
threading said valve head extension in said fifth section, said second O-ring passing from said third section into said fourth section and being held in compression in said fourth section for sealing said stem in said fourth section to prevent leakage from said body through said fourth section, said first O-ring passing from said first section through said second section and into said third section, said first O-ring resiliently compressing upon engagement with said first annular surface of said second section for squeezing said first O-ring through said second section, and

affixing the knob to the valve head extension, said first O-ring being engageable with said valve seat upon axially inward movement of the valve stem by turning the knob for closing off said first section from said third section and said longitudinal passage.

4,986,298
VACUUM REGULATOR WITH ANTIBINDING VALVE STEM CONNECTOR ASSEMBLY AND METHOD

Gordon D. Martin, Buffalo Grove, Ill., assignor to Aeros Instruments, Inc., Northbrook, Ill.

Filed Dec. 4, 1989, Ser. No. 444,867
Int. Cl.[5] G05D *16/06*
U.S. Cl. 137—15 **23 Claims**



15. A method of making a vacuum regulator with a valve stem having a valve head at one end and a body extending through a valve guide to an opposite end coupled to a movable wall of a vacuum regulation chamber by means of which binding of the stem with the valve guide is reduced, comprising the steps of:

providing a movable valve stem connector at the opposite end of the valve stem;

passing the valve stem through the valve stem guide;

mounting a mating movable valve stem connector to the movable wall;

positioning the movable wall to approximately align the mating movable valve stem connector opposite the valve stem guide;

securing the movable wall in position after said step of positioning; and

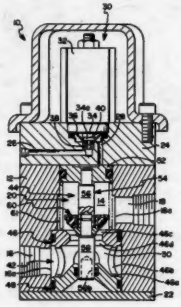
interconnecting the mating movable valve stem connectors, said movable valve stem connectors enabling movement of the valve stem relative to the valve stem guide in the event of minor misalignment which would cause binding between the valve stem guide and the valve stem during normal regulating operation.

4,986,299

REVERSIBLE POPPET VALVE CARTRIDGE

Gary R. Schultz, Kalamazoo, Mich., assignor to Eaton Corporation, Cleveland, Ohio

Filed Sep. 5, 1989, Ser. No. 402,409
Int. Cl.[5] F16K *31/122*
U.S. Cl. 137—269 15 Claims



1. A poppet valve cartridge adapted to be installed in a bore of a valve body; the cartridge comprising:

a sleeve assembly having in inner volume defined by first and second annular members concentric to a common axis and axially spaced apart by an apertured means extending therebetween, first and second mirror image valve seats facing axially in opposite directions about a periphery of a central opening in the first annular member;

a poppet assembly including a piston axially spaced from and end of the sleeve assembly defined by the first annular member, a spring applying a force biasing the piston axially away from the sleeve assembly, a generally axially facing poppet surface defined by a poppet concentrically affixed to a stem affixed at one end to the piston and extending axially therefrom through the central opening and slidably received in a guide opening in the second annular member, the stem affixable to the piston with the poppet surface disposed between the piston and the first seat and movable into abutting engagement therewith in response to a force applied to the piston counter to the spring force, whereby the cartridge is normally open, and the stem affixable to the piston with the poppet surface abuttingly engaging the second valve seat and movable therefrom in response to the counter force applied to the piston, whereby the cartridge is normally closed; and

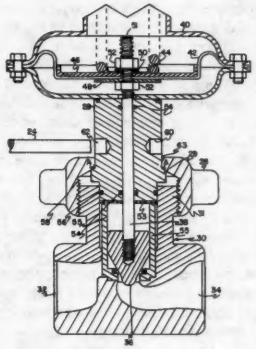
the poppet being a separate poppet member having a first side facing axially in the direction of the poppet surface, the stem including a first elongated portion and a second elongated member, the elongated portion and member having axial ends with the poppet member abuttingly fixed therebetween, the other axial ends of the elongated portion and member respectively affixed to the piston and slidably extending through the guide opening, the first side of the poppet member abutting the adjacent end of the first elongated portion to form the normally closed cartridge wherein the poppet surface is axially spaced further from the piston than the other end of the second elongated member, and the first side abutting the adjacent end of the elongated member to form the normally open cartridge wherein the poppet surface is axially spaced further from the other end of the second elongated member than from the piston.

4,986,300

BONNET NUT WITH IMPROVED SAFETY CHARACTERISTICS

Alan D. Bremers, and Melvin L. Osgood, both of Marshalltown, Iowa, assignors to Fisher Controls International, Inc., Clayton, Mo.

Filed Jun. 6, 1990, Ser. No. 534,518
Int. Cl.[5] H16K *43/00*; G01F *25/00*
U.S. Cl. 137—315 5 Claims



1. A high pressure valve comprising:

a body;

a bonnet;

seal means for sealing said bonnet to said valve body;

a bonnet nut for securing said bonnet in said body; and

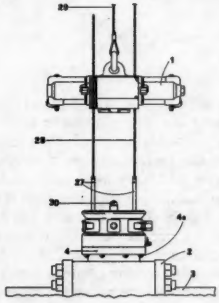
means including an aperture in said bonnet above said bonnet nut to permit levering of said bonnet against said bonnet nut by a suitable tool means cooperating with said aperture when said bonnet nut is loosened relative to said body for permitting said bonnet when said bonnet is stuck in said body to be pried loose from said body for easy disassembly of said bonnet from said body.

4,986,301

SUB-SEA VALVE ACTUATOR

Rino Ziliani, Piacenza; Giuseppe Ziveri, and Ferruccio Pellinghelli, both of Parma, all of Italy, assignors to Biffi Italia S.r.l., Italy

Filed Feb. 20, 1990, Ser. No. 482,211
Int. Cl.[5] F16K *43/00*, *51/00*
U.S. Cl. 137—315 4 Claims



3. A system for replaceable actuation means for sub-sea valve assemblies, including:

a shaft operatable valve means interposed in the stream of a pipeline and capable of opening and closing the flow through said pipeline;

coupling means rigidly associated with said valve means and affording complimentary shaft means, at one end of which shaft means said valve shaft is readily joined; said complimentary shaft means at its opposite end including a fire plurality of dogs for transmission of torque,

hydraulic actuating means including a rotary actuatable axially spring-loaded sleeve means having a second plurality of complimentary dogs designed to engage said first plurality of dogs and be maintained in engaged relation by virtue of said spring-loaded action of said sleeve means,

said coupling means and said hydraulic actuating means further including dissimilar projections and sockets positioned on opposite sides thereof to insure proper positioning of said coupling means and said hydraulic actuating means relative to each other,

said hydraulic actuating means including at least two through bores aligned with matching threaded bores in said coupling means and adapted to accept an elongated generally axially extending locating means for facilitating guided juxtaposition of said hydraulic actuating means with said coupling means, whereby upon removal of said locating means from said bores permits the introduction of threaded fastening means into said bores to securely join said hydraulical actuating means and said coupling means in said properly oriented juxtaposition.

4,986,302

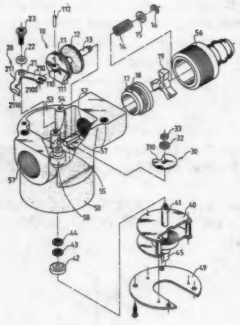
VALVE OF DIRECT PASSAGE TYPE WHICH IS RESPONSIVE TO FLUID PRESSURE

Rong-Chao Chuang, No. 113, Nan-Yang Rd., Nan-Tsu; Kaohsiung City, Taiwan

Continuation-in-part of Ser. No. 318,686, Mar. 3, 1989, abandoned. This application Jan. 16, 1990, Ser. No. 465,793

Int. Cl.[5] F16K *31/48*

U.S. Cl. 137—495 **11 Claims**



1. A manually-adjustable valve that may be opened for a selected time period but is responsive to excessive pressure to close the valve to prevent a potential safety hazard, comprising a valve body including an outlet port, a normally-closed valve covering the outlet port, a spring-loaded manually-adjustable timer mechanism including a rotatable cam in the valve body, a pivoted bell crank in the valve body and having a pair of arms, one of which is connected to the valve, and the other of which rides on the cam, one portion of the bell crank being deformable when subjected to a predetermined force, such that the timer mechanism may be adjusted manually to rotate the cam, thereby pivoting the bell crank and opening the valve for a selected time period, and the valve closing upon excessive pressure to deform the bell crank thereby preventing a potential safety hazard.

4,986,303

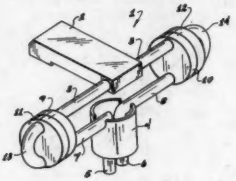
FAUCET ASSEMBLY

Christopher J. Kennedy, 7879 Eddy Rd., Colden, N.Y. 14033

Filed Jun. 18, 1990, Ser. No. 540,630

Int. Cl.[5] F16K *37/00*; E03C *1/02*

U.S. Cl. 137—559 **19 Claims**



1. A faucet assembly comprising in combination the following elements: at least one water inlet source, water feed conduits leading to faucet handles, rotatable faucet handles, visibly clear means attached to said handles and in water flow connection therewith, and water outlet means that carry water away from said handles and said visibly clear means to a water spout.

4,986,304

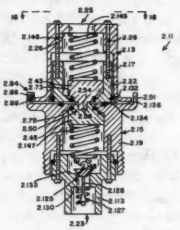
QUICK AND DRY COUPLING

John A. Vanderjagt, Memphis, Tenn., assignor to Ingersoll-Rand Company, Woodcliff Lake, N.J.

Continuation-in-part of Ser. No. 466,066, Jan. 16, 1990. This application Mar. 1, 1990, Ser. No. 486,833

Int. Cl.[5] F16L *37/32*

U.S. Cl. 137—614.02 **6 Claims**



1. A coupling operable between a coupling attached condition and a coupling detached condition, said coupling comprising:

(a) body means including a pair of head means for being coupled together when said coupling is in said attached condition and for being detached from one another when said coupling is in said detached condition; said body means having an inlet at one end thereof and an outlet at the opposite end thereof, said body means including passageway means communicating said inlet with said outlet when said coupling is in said attached condition for providing a passage for the flow of liquid through said coupling, said passageway means including a first passage portion in one of said head means and a second passage portion in the other of said head means, said pair of head means respectively including openings joined together when said coupling is in said attached condition to provide an intermediate portion of said passageway means, said pair of head means including a pair of coacting mating means respectively provided on said pair of head means movable between an open position for providing a space therebetween forming an open part of said passageway means for liquid flow when said coupling is in said coupling attached condition and a closed position for closing

off the flow of liquid from said pair of head means when said coupling is in said coupling detached condition;

(b) latching means including latching portions respectively attached to said head means for coacting between said head means when said head means are engaged and turned relative to one another and for selectively being movable to a latched position for providing said attached condition of said coupling, to an intermediate position, and to an unlatched position for providing said detached condition of said coupling;

(c) actuating means operably coupled between said latching means and said pair of mating means for moving said pair of mating means in opposite directions away from one another towards said open position when said pair of mating means are engaged and said pair of head means are turned in one direction relative to one another to move said latching means between said intermediate position and said latched position and for permitting movement of said pair of mating means towards one another when said pair of head means are turned relative to one another in a direction opposite from said one direction to move said latching means between said latched position and said intermediate position, said actuating means including at least one cooperating cam means operably coupled between said body member of one of said head means and one of said mating means, at least another cooperating cam means operably coupled between said body member of the other of said head means and the other of said mating means, each of said cooperating cam means including a cam surface and a cam follower, and means for respectively turning said cam surfaces relative to said cam followers;

(d) expelling means in said body means for expelling liquid from said space between said pair of mating means and said intermediate portion of said passageway when said pair of mating means are moved from said open position to said closed position thereof and for completely occupying any remaining space between said pair of mating means and in said intermediate portion of said passageway means when said pair of mating means are in said closed position; and including seal means coacting between said openings and said pair of mating means when said pair of mating means are in said closed position; whereby when said coupling is detached there is substantially no drip of liquid from said coupling, said expelling means including a pair of cooperating connecting means respectively provided on said mating means for selectively connecting said mating means together for limiting turning movement thereof relative to one another but permitting relative movement towards and away from one another, one of said pair of connecting means including socket means and the other of said connecting means including protrusion means complementary shaped relative to said socket means for completely occupying said socket means when said heads are in said closed condition whereby any waste fluid previously in said socket means is expelled therefrom; and

(e) means urging said pair of mating means towards one another for moving said pair of mating means into said closed position in which the fluid flow is stopped when said latching means is moved from said latched position to said intermediate position.

4,986,305

FLUIDIC MULTIPLEXER

John C. Richards, Mason, and Joseph P. Smith, Jr., Cincinnati, both of Ohio, assignors to General Electric Company, Cincinnati, Ohio

Filed Feb. 17, 1988, Ser. No. 156,688
Int. Cl.[5] F17D *3/00*
U.S. Cl. 137—625.15 **4 Claims**

1. A fluidic multiplexer for controlling a fluidic motor, comprising:

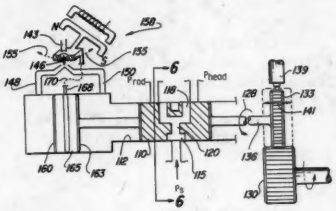
(a) a cylinder;

(b) a drum continuously rotatable within the cylinder;

(c) an annular groove in the drum;

(d) a conduit connecting between the annular groove and the surface of the drum;

(e) a plurality of openings in the cylinder, with each of



which the conduit periodically communicates for a time interval during rotation of the drum;

(f) means for applying hydraulic fluid at a selected pressure to the annular groove; and

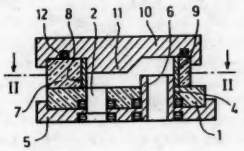
(g) means for sealing each opening between periodic communications with the conduit.

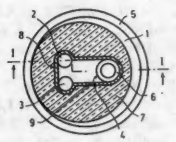
4,986,306

SINGLE HANDLE MIXER VALVE WITH HARD MATERIAL PLATES, HAVING A MOVABLE PLATE SWINGING AROUND THE DELIVERY CONNECTION

Leopoldo Ferrari, Lacchiarella, Italy, assignor to Studio Tecnico Sviluppo E Ricerche S.T.S.R. s.r.l., Milan, Italy

Filed Mar. 14, 1990, Ser. No. 493,313
Claims priority, application Italy, Mar. 31, 1989, 67226 A/89
Int. Cl.[5] F16K *11/074, 47/02*
U.S. Cl. 137—625.17 **11 Claims**





1. A single handle mixer valve comprising a fixed plate and a movable plate superimposed on and contacting said fixed plate, both said plates being made of a hard material, said fixed plate having at least two inlet passages for hot and cold water and a delivery passage for mixed water, and said movable plate having a cavity forming a duct for water passage, the mixer valve further comprising a fixed member forming a delivery connection for mixed water, said fixed member extending up to the level of the movable plate and being engaged within said cavity of the movable plate and forming between said movable

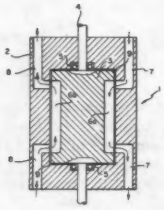
plate and said fixed member a kinematic coupling which allows both rotation and translation of the movable plate relative to said fixed member, whereby said movable plate may swing around said fixed member acting as a fulcrum, which guides the displacements of the movable plate.

4,986,307

ROTARY PNEUMATIC VALVE

Harry C. Hardee, Albuquerque, N. Mex., assignor to The United States of America as represented by the United States Department of Energy, Washington, D.C.

Filed Aug. 2, 1989, Ser. No. 387,913
Int. Cl.[5] F16K *11/07*
U.S. Cl. 137—625.19 **4 Claims**



1. A rotary valve for high-frequency, low-torque application, comprising:

a housing including at least one pair of opposing gas inlet and gas exhaust conduits,

a valve spindle having at least one bearing at each of first and second ends thereof and provided with at least one pair of opposing slots which upon rotation align with said inlet and exhaust gas conduits respectively,

a gap between the interior of said housing and the exterior of said spindle, maintained by said bearings, for separating said spindle from said housing and for centering said spindle inside said housing, and

a spindle shaft for rotating said valve spindle,

wherein said alignment of said at least one pair of gas inlet and gas exhaust conduits in said housing and said at least one pair of opposing slots in said valve spindle occurs sequentially in response to rotations of said valve spindle such that said rotary valve provides at least two complete switching cycles for every rotations of said valve spindle.

4,986,308

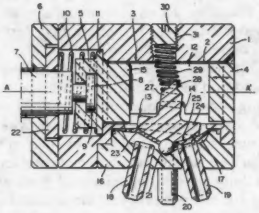
SWITCHING MICROELECTROVALVE HAVING A SINGLE MEMBRANE

Serge Champseaux, Les Mureaux, France, assignor to ABX, Levallois Perret, France

Continuation of Ser. No. 338,432, Apr. 14, 1989, abandoned, which is a continuation of Ser. No. 141,869, Jan. 11, 1988, abandoned. This application Apr. 30, 1990, Ser. No. 517,519
Claims priority, application France, Jan. 12, 1987, 87 00209
Int. Cl.[5] F16K *11/052*
U.S. Cl. 137—625.44 **13 Claims**

1. A microelectrovalve having at least two ways, said microelectrovalve comprising a valve body having a compartment, fluid intake and discharge pipes attaching to said compartment, a movable closure member for selectively closing one of said pipes, an electromagnetic core for controlling the position of said movable closure member, said movable closure member comprising a single elastically deformable membrane, a rocker for selectively engaging said membrane against one of said pipes for closing said pipes, and a control spool movable within said valve body under control of said electromagnetic core for moving said rocker to one of two balance positions corresponding to one of two closure positions of the membrane, said membrane being elastically deformable into contact with seats of said pipes; and

further comprising a well passing through a longitudinal axis of said valve body, said well having first and second outlet openings, and wherein said control spool is contained in



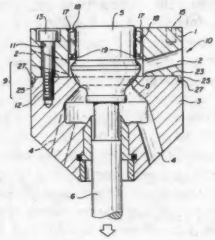
said well and arranged along a longitudinal axis of said valve body, a first end of said spool being flush with an end surface of said valve body when said spool is moved to a position corresponding to one of said two balance positions of said rocker, and a second end of said control spool being proximate said electromagnetic core.

4,986,309

MAIN STEAM BY-PASS VALVE

Charles P. Bellanca, Maysville, Ky., assignor to Dayton Power and Light Company, Aberdeen, Ohio

Filed Aug. 31, 1989, Ser. No. 401,143
Int. Cl.[5] F16K *1/12*
U.S. Cl. 137—630.14 **9 Claims**



1. A stop valve comprising:

a stop valve body having one or more inlets and one or more outlets;

a stop valve by-pass valve adjustably positioned within said stop valve body and adapted to seat in said stop valve;

said stop valve by-pass valve comprising a by-pass valve body having one or more inlet ports extending from an outer surface to an inner surface and one or more outlet ports, a by-pass disc having a central axis and slidably disposed in said by-pass valve body for movement parallel to said central axis, and

wherein said one or more inlet ports extend from said outer surface to said inner surface in a direction not intersecting said central axis; and

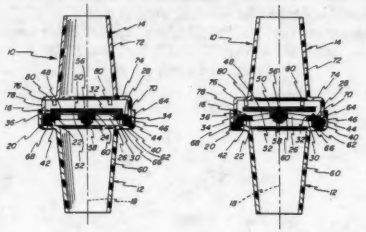
means for adjusting the position of said stop valve by-paas valve and the position of said by-pass disc.

4,986,310

LOW PRESSURE CHECK VALVE

James C. Bailey, Yellow Springs; Gordon E. Atkinson, Cedarville, and Dennis A. Boehmer, Xenia, all of Ohio, assignors to Vernay Laboratories, Inc., Yellow Springs, Ohio

Filed Jan. 22, 1990, Ser. No. 468,424
Int. Cl.[5] F16K *15/14*
U.S. Cl. 137—859 26 Claims



1. A check valve allowing fluid flow in a first direction and preventing fluid flow in a second direction comprising:

a housing having an inlet and an outlet;

a regulator assembly having a first flexible regulator portion and a second relatively inflexible regulator portion;

said first regulator portion extending diametrically across said housing and having means defining apertures for allowing fluid flow in said first direction therethrough;

said second regulator portion attached to said first regulator portion and including a sealing surface for contacting said first regulator portion for preventing fluid flow in said second direction;

means for attaching said regulator assembly to said housing; and

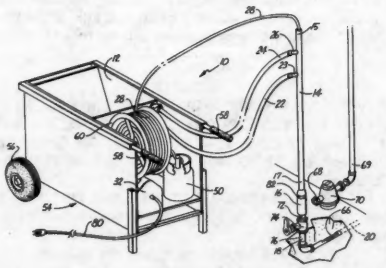
said fist regulator portion being adapted to flex whereby said second regulator portion is caused to move relative to said housing to allow said sealing surface of said second regulator portion to separate from said first regulator portion during fluid flow in said first direction.

4,986,311

APPARATUS FOR CLEARING FROZEN WATER LINES

James D. Mikkelson, Rte. 1, Box 9AA, Waubay, S. Dak. 57273

Filed Aug. 9, 1989, Ser. No. 391,231
Int. Cl.[5] E03B *7/14*
U.S. Cl. 138—35 12 Claims



1. An apparatus for clearing a conduit which is obstructed by a removable substance and is blocked, the apparatus including:

(a) a main frame;

(b) a reservoir open to the atmosphere and mounted to the main frame;

(c) a generally upright standpipe having a top end portion open to the atmosphere;

(d) means for attaching a bottom end portion of the standpipe to be open to, longitudinally aligned with, and in sealing relation with respect to one open end portion of the obstructed conduit;

(e) a first hollow return line open from an intermediate portion of the standpipe at a position vertically above the effective height of the reservoir and into the reservoir;

(f) a second hollow return line open from a portion of the standpipe between the opening of the first return line into the standpipe and the open top end portion of the standpipe, said second return line also being open into the reservoir;

(g) a length of hollow, relatively rigid but flexible tubing having an outer diameter substantially less than the minimum inner diameter of the blocked conduit, the upright standpipe and the means for attaching the standpipe to the conduit, said tubing being adapted to have a first discharge end thereof inserted freely into the open top end portion of the standpipe, fed freely through the standpipe and into the blocked conduit to have position immediately adjacent the removable substance, and having a second intake end portion, the tubing having dimensions relative to the conduit such that the open cross sectional area of the interior of the tubing does not exceed the open cross sectional area between the outside of the tubing and the interior walls of the conduit, the standpipe and the means for attaching the standpipe to the conduit at any point along the tubing within the standpipe, the attaching means and conduit to allow unimpeded return flow between the outer surface of the tubing and said interior walls to and through the return lines;

(h) a pump mounted to the frame and having an intake port open to a bottom portion of the reservoir and a discharge port open to the second intake end portion of the flexible tubing; and

(i) sufficient circulating fluid initially within the reservoir so that when the pump is put into operation, the fluid will more than fill the pump, the tubing, the blocked portion of the conduit and that portion of the standpipe below the opening of the first return line into the standpipe, the circulating fluid having the property of reducing to a flowable stream the substance obstructing the conduit.

4,986,312

FLOW CONTROL DEVICE

Robert M. Gute, Corunna, Mich., assignor to Huron Products Corporation, Mt. Clemens, Mich.

Filed Mar. 7, 1989, Ser. No. 319,961
Int. Cl.[5] F16L *1/14;* B05B *1/26*
U.S. Cl. 138—45 4 Claims

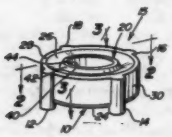
1. A flow controller comprising:

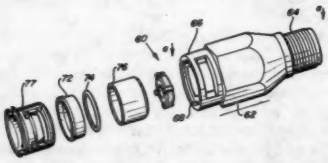
a disk-shaped body including an axial bore, said disk body includes a pair of major faces, one of said major faces being inwardly tapered toward said axial bore, said taper is at an angle of from about 21° to about 25° with respect to a plane transverse to said axial bore;

means adapted for positioning said disk-shaped body a desired distance from a wall such that in a first position in a fluid flow, fluid would be enabled to pass through said axial bore and around said disk-shaped body, in a second position fluid would be enabled to pass through only said axial bore, said positioning means including a plurality of leg members projecting from the other major face of disk-shaped body at spaced locations such that said legs project axially and radially from said disk-shaped body, said positioning means coupled with said disk body; and

lip flange adapted for controlling fluid flow through said axial bore of said disk-shaped body comprising an annular member, said lip flange positioned peripheral about an end

of said axial bore wherein a side of the lip flange is continuous with interior side of said disk-shaped body defining





said axial bore and an opposing side of said annular member being at an angle of from about 26° to about 31° with respect to said continuous side of said annular member.

4,986,313

SEALING PLUG FOR A STEAM-GENERATOR TUBE

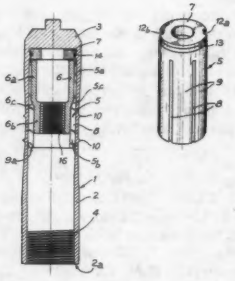
Jean-Charles Mounet, Meyzieu, France, assignor to Framatome, Courbevoie, France

Filed Oct. 12, 1989, Ser. No. 420,484

Claims priority, application France, Oct. 12, 1988, 88 13434

Int. Cl.[5] F16L *55/00*

U.S. Cl. 138—89 **7 Claims**



1. Sealing plug of a steam-generator tube (20) comprising a tubular body (2), a bottom (3) closing one end of said tubular body, and means of diametral expansion (5, 6) of said plug, said means comprising a bush (5) placed inside a body (2) of said plug in an expansion zone and an expander core (6) having an actuating surface (6c) interacting with a corresponding surface (5c) of said bush (5) in order to produce its diametral expansion and expansion of said plug, wherein said bush (5) comprises at least two elastic cylindrical sectors (9) separated by at least two longitudinal slots, and, on its inner wall, an actuating surface (5c) widened towards said bottom (3) of said plug, the expander core (6) engaged inside said slotted bush (5) having, on its outer surface, a corresponding actuating surface (6c) located on a same side as said bottom (3) of said plug in relation to said actuating surface (5c) of said bush (5), when said plug (1) is in its unexpanded state allowing it to be introduced into said tube (20), expansion of said plug being obtained by shifting said expander core (6) inside said bush (5) towards an open end of said body (2) of said plug opposite said bottom (3).

4,986,314

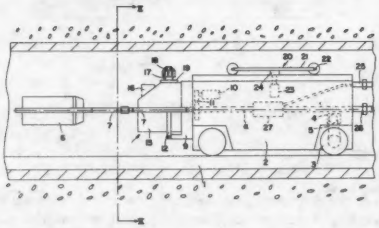
APPARATUS FOR CARRYING OUT REPAIR WORKS ON A DAMAGED PIPELINE WHICH A PERSON CANNOT GET THROUGH

Erich Himmler, Zurich, Switzerland, assignor to Kunststoff-Technik AG Himmler, Zurich, Switzerland

Continuation of Ser. No. 899,386, Aug. 1, 1986, abandoned. This application Nov. 20, 1987, Ser. No. 123,312

Int. Cl.[5] F16L *55/18*

U.S. Cl. 138—97 **7 Claims**



6. Apparatus for carrying out repair work on a damaged pipeline which a person cannot get through, said apparatus comprising a self-propelled carriage; a television camera mechanically coupled to the carriage for finding and locating areas to be repaired in the pipeline; and a tool holder pivotable about the longitudinal axis of the carriage for holding an exchangeable tool that is arranged transversely to said longitudinal axis, said tool holder including a working head rotatable by at least one full turn, said working head comprising a feed cylinder displaceable transversely to the longitudinal axis and having a drive for a shaft and means arranged on said shaft for clamping the exchangeable tool, said working head further comprising a hydraulic cylinder device that displaces the feed cylinder transversely to the longitudinal axis of the carriage independently of the rotational position of the working head;

wherein there is provided on an outside of one face of the carriage a bearing for receiving the working head, said bearing being rotatable by a drive arranged on an inside of said one face, said bearing having an L-shaped cross section and a shackle rigidly connected thereto for rotation therewith, the working head abutting with one face against the bearing and being supported by the shackle between two ends thereof at two points on opposite sides of the working head which are located substantially in a plane passing through the longitudinal axis of the shaft on which the tool clamping means and the tool are arranged.

4,986,315

WEAVING MACHINE WITH A SYNCHRONOUSLY OR INDEPENDENTLY OPERABLE MECHANICAL DOBBY

Fred Borisch, Breul 22, D-4400 Münster, and Georg Kreisel, Unmatenstiege 10, D-4408 Dülmen, both of Fed. Rep. of Germany

PCT No. PCT/DE88/00437, § 371 Date Apr. 11, 1989, § 102(e) Date Apr. 11, 1989, PCT Pub. No. WO89/01540, PCT Pub. Date Feb. 23, 1989

PCT Filed Jul. 15, 1988, Ser. No. 353,660

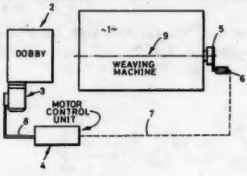
Claims priority, application Fed. Rep. of Germany, Aug. 12, 1987, 8710997[U]; Jun. 3, 1988, 3819004

Int. Cl.[5] D05C *1/12*

U.S. Cl. 139—66 R **8 Claims**

1. A weaving installation, comprising a weaving machine; a dobby; and means for driving said dobby, said driving means including first means responsive to operation of said weaving

machine and second means operable independently of said weaving machine, said first means comprising a pulse generator, and said second means including a motor for said dobby operable in response to pulses produced by said pulse generator.



4,986,316

PACKAGE FEED FOR A PRESCRIBED WEFT LENGTH OF CARBON FIBER

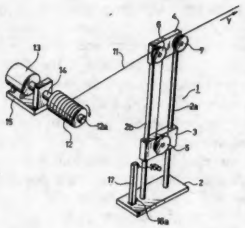
Kazuo Morohashi, Yokohama; Masayoshi Kawasaki, Kawasaki; Kazuo Tsukabayashi, and Saburo Hamade, both of Kanazawa, all of Japan, assignors to Ishikawa Prefecture, Kanazawa and Nippon Oil Company, Ltd., Tokyo, both of, Japan

Filed Sep. 12, 1989, Ser. No. 406,242

Claims priority, application Japan, Sep. 12, 1988, 63-226417

Int. Cl.[5] D03D *47/34*

U.S. Cl. 139—452 **8 Claims**



1. A method for feeding a weft to weave a carbon fiber fabric, comprising the steps of:

rotatably supporting a carbon fiber package having a shaft, wherein the axis of said shaft is substantially perpendicular to a running direction of said carbon fiber;

rotating said carbon package so that a prescribed length of said carbon fiber necessary for one shot weaving of said weft is fed out;

reserving said carbon fiber having said prescribed length in a reservoir;

detecting said carbon fiber reserved in said reservoir having said prescribed length necessary for one shot weaving of said weft;

stopping rotation of said package automatically when said carbon fiber having said prescribed length is detected in said detecting step; and

shooting said weft of said carbon fiber having said prescribed length into a warp shed.

4,986,317

METHOD FOR MAKING ELECTRODE PLATE FOR LEAD STORAGE BATTERIES

Katsuhiro Takahashi, Toyahashi; Kazuyoshi Yonezu, Kosai; Hiroshi Yasuda; Ichiro Sano, both of Toyohashi, and Toshiaki Kimura, Kosai, all of Japan, assignors to Matsushita Electric Industrial Co., Ltd., Osaka, Japan

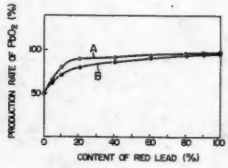
PCT No. PCT/JP88/00587, § 371 Date Apr. 19, 1989, § 102(e) Date Apr. 19, 1989, PCT Pub. No. WO88/10518, PCT Pub. Date Dec. 29, 1988

PCT Filed Jun. 16, 1988, Ser. No. 315,689

Claims priority, application Japan, Jun. 19, 1987, 62-153669

Int. Cl.[5] H01M *6/00*

U.S. Cl. 141—1.1 **5 Claims**



1. A method of making an electrode plate for a lead storage battery, which comprises filling a support for an active material with a paste comprised mainly of a lead powder, water and sulfuric acid kneaded together, said lead powder consisting of lead monoxide, a lead oxide convertible to red lead, and metallic lead, the conversion of the lead oxide to red lead being 90 wt% or less.

4,986,318

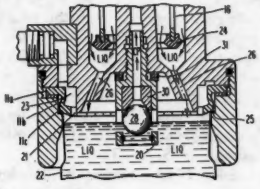
FILLING VALVE FOR COUNTERPRESSURE FILLING OF CANS

Chung J. Yun, Baltimore, Md., assignor to Crown Cork & Seal Company, Inc., Philadelphia, Pa.

Continuation-in-part of Ser. No. 325,289, Nov. 27, 1981, Pat. No. 4,442,873, and a continuation of Ser. No. 125,232, Jan. 25, 1988, abandoned, which is a continuation of Ser. No. 807,440, Dec. 10, 1985, Pat. No. 4,750,533, which is a continuation-in-part of Ser. No. 574,184, Jan. 26, 1984, abandoned, and Ser. No. 796,892, Nov. 12, 1985, abandoned, which is a continuation-in-part of Ser. No. 574,184,. This application Nov. 8, 1989, Ser. No. 434,565

Int. Cl.[5] B67C *3/06*

U.S. Cl. 141—39 **19 Claims**



1. A valve for the counterpressure filling of cans with a pressurized fluid comprising:

(a) a valve body;

(b) valve member movable with respect to said valve body from a closed position to a substantially open position for dispensing the pressurized fluid to the cans;

(c) sealing means coupled to said valve body for sealing the cans to the valve body, said sealing means comprising a flexible ring-shaped member movable from a normally unexpanded position to an expanded position, said ring-

shaped member being moved by said pressurized fluid from said normally unexpanded position to said expanded position such that in said expanded position said flexible ring-shaped member exerts a radial sealing pressure on said cans.

4,986,319

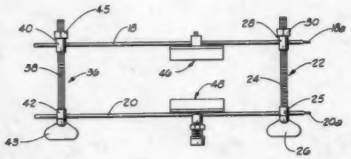
BOAT ENGINE WINTERIZING DEVICE

Marvin A. Ahlefeld, 2005 Rolling Ridge, Bethany, Okla. 73008

Filed Mar. 13, 1990, Ser. No. 492,846

Int. Cl.[5] B65B *3/04*; B63B *17/00*

U.S. Cl. 141—98 **7 Claims**



1. A device for winterizing boat engines by replacing the engine coolant with an antifreeze solution, said device comprising:

a pair of spaced, elongated rods of substantially the same length, said rods having first, opposed end portions, and having second, opposed end portions;

a first clamp subassembly interconnecting said first opposed end portions of the rods and adjustable to move said first opposed end portions of the rods toward and away from each other;

a second clamp subassembly interconnecting the second opposed end portions of the rods and adjustable to move said second end portions of the rods toward and away from each other;

a first sealing head subassembly movably mounted on one of said rods for axial movement therealong, said first sealing head subassembly including:

a first slide block having an opening therethrough slidably receiving said one rod;

means for releasably fastening said first slide block to said one rod to adjustably fix the position of the first slide block on said one rod;

a first resilient sealing ring carried on said one slide block and sealingly engageable with the boat outdrive at a location surrounding and enclosing the water intake ports thereto at a time when the slide block is positioned opposite said water intake ports;

a hose nipple connected to said first sealing ring and having an end opening into the interior thereof for introducing antifreeze solution to said water intake ports via said first sealing ring; and

a second sealing head subassembly movably mounted on the other of said elongated rods for axial movement therealong, said second sealing head subassembly including:

a second slide block having an opening therethrough slidably receiving said second rod;

means for fastening said second slide block to said second rod to fix the position of said second slide block on said second rod; and

a resilient sealing means carried on said second slide block and sealingly engageable with the boat outdrive at a location on the opposite side thereof from said water intake ports.

4,986,320

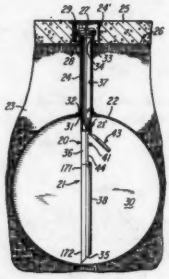
DROP TUBE HAVING AN OVERFILL VALVE

James E. Kesterman, 3135 Limeston Cir., Cincinnati, Ohio 45239, and Jack A. McMath, 121 Newman, Fort Thomas, Ky. 41075

Continuation of Ser. No. 108,152, Oct. 13, 1987, abandoned. This application Apr. 7, 1989, Ser. No. 335,035

Int. Cl.[5] B63B *1/30*

U.S. Cl. 141—198 **38 Claims**



1. A drop tube adapted for use in the discharge of liquid fuel, or the like, into a storage tank of the type having an inlet riser pipe, the drop tube having an overfill valve for limiting the discharge of fuel into the storage tank,

said drop tube comprising

a tubular member insertable through the riser pipe to an operative position of the drop tube and defining a passage through which fuel is discharged into the tank, and

said overfill valve comprising

a valve member disposed within said tubular member and movable between an open position and a closed position,

a float mounted on the tubular member and projecting laterally therefrom when the drop tube is in its operative position, and

means connecting said valve and float, said connecting means, in the operative position of the drop tube, displacing the valve member towards its closed position in response to upward movement of the float to a position reflecting a desired height for fuel in the tank,

characterized in that

said tubular member has a depression, and

said float is displaceable to an insertion position in which the float is disposed in said depression and the tubular member is insertable through the riser pipe.

4,986,321

FUEL DISPENSING NOZZLE HAVING A FLOW RATE LIMITER

Leonard R. Nitzberg, P.O. Drawer 107, Knoxville, Tenn. 37919, and Paul D. Manhardt, 1008 Tokalon Dr., Knoxville, Tenn. 37922

Continuation-in-part of Ser. No. 21,399, Mar. 4, 1987. This application Jul. 27, 1989, Ser. No. 385,796

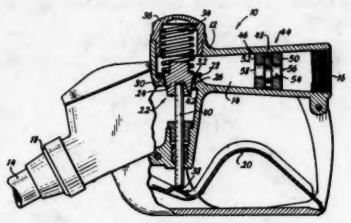
The portion of the term of this patent subsequent to Jul. 4, 2006, has been disclaimed.

Int. Cl.[5] B65B *3/00*

U.S. Cl. 141—206 **9 Claims**

1. A fuel dispensing nozzle having an inlet through which liquid fuel is supplied, to said nozzle under pressure, an outlet means adapted to discharge fuel into a fuel tank of a vehicle, an internal flow passage along which said fuel flows from said inlet to said outlet, manually operable valve means disposed within said passage intermediate said inlet and said outlet for selectively opening communication between said inlet and said outlet to permit fuel to flow from said inlet to said outlet, and

fuel rate limiting means for limiting the volumetric rate of fuel flowing through said nozzle to a predetermined maximum rate independent of the fuel inlet pressure and independent of the amount of communication provided between said inlet and said outlet by said valve means, said fuel rate limiting means comprising housing means disposed in said flow passage, said housing means having a passageway for ingress and egress of fuel and for providing a pressure differential across said housing when fuel is flowing, a valve movably mounted in said housing for movement in response to the pressure differential across said housing between a first position which opens said passageway and other positions which partially obstruct said passageway and limit the fuel flowing therethrough to said predeter-



mined maximum rate, said valve including a first surface exposed to the higher pressure upstream of said housing and a second surface exposed to the lower pressure downstream of said housing, said first and second surfaces being disposed relatively to one another for providing opposing forces on said valve for moving said valve between said first position and said other positions in response to said pressure differential, and biasing means for maintaining said valve in said first position when said manually operable valve initially opens communication between said inlet and said outlet and until said predetermined maximum flow rate is attained, whereupon a threshold differential results across said housing to move said valve from said first position to said other positions to limit the rate of fuel flow to said predetermined maximum amount.

4,986,322

SYSTEM OF PACKAGING FOR READY TO USE PREPARATIONS

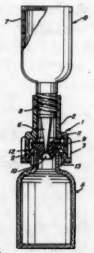
Jean Chibret, Cannes, and Charles Manni, Principaute de Monaco, both of France, assignors to Societe Semco, Monaco, France

Continuation of Ser. No. 142,923, Jan. 12, 1988, abandoned. This application Oct. 3, 1989, Ser. No. 418,713

Claims priority, application France, Mar. 24, 1987, 87 04195; Jul. 29, 1987, 87 10864

Int. Cl.[5] B65D *81/32*

U.S. Cl. 141—319 **4 Claims**



1. An assembly for connecting a first, solid-containing flask having a neck portion with a second, compressible, liquid-containing flask, said second flask having an externally threaded neck portion and a pointed dropper associated with said threaded neck portion for introducing liquid from said second flask into said first flask and for then aspirating the resulting solution or suspension into said second flask, comprising,

a generally cylindrical, integrally formed connector having an upper portion having an internal thread engaging said threaded neck portion of said second flask and receiving said dropper, said connector having a lower portion;

rupturable closing means formed inside and diametrically across said connector intermediate said upper and lower portions thereof and defining separate respective interior spaces in said connector portions, said closing means being formed in said integrally formed connector sufficiently close to said connector internal thread that said pointed dropper ruptures said closing means upon rotation of said externally threaded neck portion into said connector internal thread; and

a collar formed around the neck portion of said first flask, said collar being frictionally fitted in said interior space of said lower portion of said connector, and having an outwardly extending upper part and vertically extending ribs engaging with said connector and thereby preventing undesired rotation of said collar during screwing of said second flask into said connector, said closing means having an enlarged upper portion resting on said upper part of said collar.

4,986,323

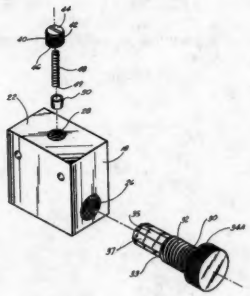
ADJUSTABLE STOP APPARATUS

Albert L. Lemaire, Jr., Rte. 4, Box 548, New Iberia, La. 70560

Filed Apr. 13, 1990, Ser. No. 520,362

Int. Cl.[5] B27B *31/00*

U.S. Cl. 144—253 R **5 Claims**



1. An apparatus mountable on a table saw, for adjusting the cut of a board, the apparatus comprising:

(a) a body portion mountable onto the table saw;

(b) a first threaded member threadably into the outer face of the body portion, calibrated so that one complete rotation of the threadable member moves the threadably member a particular distance inwardly or outwardly from the face; and

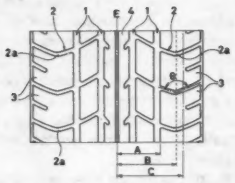
(c) means threadably into a second face of the apparatus for contacting a portion of the shaft of the threadable member, for defining a means to indicate the amount of segmental rotation of the threadable member as it rotates in its circular fashion.

4,986,324

PNEUMATIC TIRE TREAD WITH SYMMETRICAL GROOVES HAVING A BENT SHOULDER PORTION

Toshihiko Suzuki, and Kenichi Shirai, both of Hiratsuka, Japan, assignors to The Yokohama Rubber Co., Ltd., Tokyo, Japan

Filed Mar. 31, 1989, Ser. No. 331,331
Claims priority, application Japan, Apr. 28, 1988, 63-104030
Int. Cl.[5] B60C *11/03*
U.S. Cl. 152—209 R 5 Claims



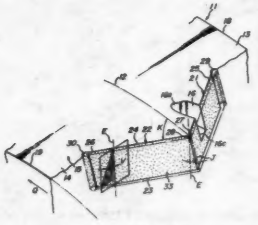
1. A pneumatic tire having a tread pattern formed on a tread surface between two shoulder regions of the tire comprising a plurality of main grooves extending straightforward in the center region of said tread surface in the circumferential direction of the tire and a plurality of subgrooves extending so as to straightly cross said plurality of main grooves and lead to end portions of said shoulder regions, said main grooves and said subgrooves are symmetrically provided about the equator of said tire, a percentage groove area of all of the grooves including said main grooves and said subgrooves relative to the total area of the tread surface is 20 to 30%, the number of pitches at which the circumferential direction of the tire is divided by said plurality of subgrooves is 30 to 45, said subgrooves each have a bent groove portion bent in a wedge form in each shoulder region located outside an outermost main groove, and an included angle θ of said bent groove portion is 130° to 160°.

4,986,325

PNEUMATIC TIRE INCLUDING SIPES

Hiroyuki Matsumoto, Tachikawa, Japan, assignor to Bridgestone Corporation, Osaka, Japan

Division of Ser. No. 61,521, Jun. 15, 1987. This application May 1, 1989, Ser. No. 345,335
Claims priority, application Japan, Jun. 13, 1986, 61-137546; Mar. 11, 1987, 62-55668
Int. Cl.[5] B60C *11/12*
U.S. Cl. 152—209 R 4 Claims



1. A pneumatic tire comprising; a plurality of sipes in a tread of the tire, said sipes extending substantially in axial directions of the tire but inclined relative to an equatorial plane of the tire and spaced apart from each other in circumferential directions, each said sipe being inclined with its opening on a tread surface being positioned forward of a sipe bottom in a rotating direction of the tire, said sipes arranged on both sides of said equatorial plane and sipes extending from both sides of the equatorial plane connected at the equatorial plane to form V-shaped sipes, axially outer ends of said sipes extending from both sides of the equatorial plane are positioned forward of axially inner ends located at the equatorial plane in said rotating direction of said tire, and

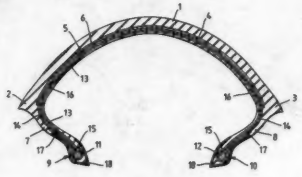
wherein intersection angles between the sipes and the equatorial plane are within the range of 50°–80°.

4,986,326

RADIAL MOTORCYCLE TIRE

David R. Watkins, Birmingham; Gerald A. Griffiths, Walsall, and Peter Ingley, Tamworth, all of Great Britain, assignors to SP Tyres UK Limited, Birmingham, England

Continuation of Ser. No. 30,683, Mar. 26, 1987, abandoned. This application Dec. 20, 1988, Ser. No. 289,397
Claims priority, application United Kingdom, Apr. 1, 1986, 8607889
Int. Cl.[5] B60C *9/02, 15/06*
U.S. Cl. 152—532 4 Claims



1. A motorcycle radial racing tire comprising

a tread region reinforced by a breaker assembly containing at least an outer breaker ply and a radially inner breaker ply, said outer breaker ply having lateral edges extending beyond lateral edges of the inner breaker ply,

sidewall portions extending inwardly from both ends of the tread region and terminating in bead regions containing annular bead cores,

a carcass reinforcement ply comprised of radially disposed cords which extend into the bead regions and wrap around the annular bead cores to provide a carcass ply turn up edge, and

a rubber sidewall member having an upper edge and a lower edge, said lower edge being positioned adjacent the bead core, radially inward of the carcass ply turn up edge and extending through the tire sidewall portions immediately adjacent to and axially outwards of the carcass ply with the upper edge thereof being positioned to abut against the lateral edge of the radially innermost positioned breaker ply of said breaker assembly, with the outer breaker ply being in direct contact with and overlying the abutting edges of the inner breaker ply and the rubber sidewall member by between 3 and 10 mm, whereby the breaker assembly is connected with the rubber sidewall member, said rubber sidewall member thus being securely anchored into the breaker tread assembly and having an untapered substantially constant thickness along its length before tire shaping, a thickness at said upper edge that is not less than 60% of its thickness at said lower edge after tire shaping, and a modulus in the range of 10 to 20 MPa.

4,986,327

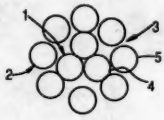
LOW PROFILE RADIAL TIRES FOR TRUCKS AND BUSES REINFORCED WITH STEEL CARCASS PLY CORDS

Koji Takahira, Nara, Japan, assignor to Toyo Tire & Rubber Co., Ltd., Osaka, Japan

Filed Jul. 25, 1988, Ser. No. 224,013
Claims priority, application Japan, Jul. 23, 1987, 62-185223
Int. Cl.[5] B60C *9/00, 9/02;* D02G *3/36*
U.S. Cl. 152—556 3 Claims

1. A low profile radial tire for trucks and buses reinforced with steel carcass ply cords, said steel cords being composed of

two layers of a core and an outer layer, the core comprising 3 to 4 filaments and the outer layer comprising the number of filaments equal to or less than the number 5 greater than the number of the core filaments, all of said core filaments and outer filaments being substantially equal in diameter, the core



filaments and the outer filaments being twisted in the same direction with a different pitch, the aspect ratio of the tire being at most 0.85, and the steel cords having a cord strength of at least 285 kg/mm^2 that is calculated using the following formula:

$$\text{Cord strength} = \frac{\text{tensile strength (kg)} \times 7.86\ \text{g/cm}^3\ \text{(iron density)}}{\text{Cord weight (g/m)}}$$

4,986,328

TIRE MOUNTING DEVICE

Kai Metzger, Moosinning, Fed. Rep. of Germany, assignor to Stahlgruber Otto Gruber GmbH & Co., Munich, Fed. Rep. of Germany

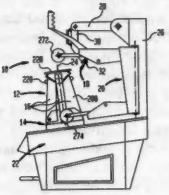
PCT No. PCT/EP88/01193, § 371 Date Sep. 14, 1989, § 102(e) Date Sep. 14, 1989, PCT Pub. No. WO89/06604, PCT Pub. Date Jul. 27, 1989

PCT Filed Dec. 22, 1988, Ser. No. 411,454

Claims priority, application Fed. Rep. of Germany, Jan. 14, 1988, 8800372

Int. Cl.^{5} B60C *25/07*

U.S. Cl. 157—1.24 **32 Claims**



1. An apparatus for mounting a tire on a wheel rim or unmounting it therefrom comprising:

a pneumatic motor for rotating the rim, said motor having a rotor and a stator and a plurality of radially arranged piston/cylinder units and a plurality of cam indentations disposed on a circle;

a holding means for firmly holding the rim, comprising self centering expander arms which extend outward the pneumatic motor;

a pulling means for pulling the bead edges of the tire over a flange of the wheel, said pulling means having an element for bracing against the wheel flange; and

a means for forcing the bead edge of the tire into the rim bed, said forcing means comprising rollers acting on both beads simultaneously.

4,986,329

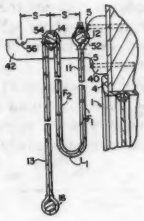
WINDOW COVERING ASSEMBLY WITH DISCRETE POSITIONING FEATURE AND METHOD OF USE

Mary L. Kupchunos, 392 Felt Rd., South Windsor, Conn. 06074

Filed Feb. 14, 1990, Ser. No. 479,834

Int. Cl.^{5} E06B *9/06*

U.S. Cl. 160—84.1 **21 Claims**



1. Window covering assembly comprising:

a first bracket and a second bracket each being separately positionable in a spaced apart relationship relative to one another on a support surface;

a covering formed from limp sheet material and being vertically positionable at different heights relative to said first and said second brackets;

said covering having at least two substantially transversely extending pockets formed therein;

a plurality of rods each respectively received within one of said pockets formed in said covering, with each of said rods having opposite end portions projecting outwardly laterally beyond said covering;

said first and said second brackets each having corresponding discrete spaces thereon sized for receiving an end portion of one of said plurality of rods therein; and

wherein said covering is vertically supported by said first and said second brackets when said opposite end portions of at least one of said plurality of rods are received within a corresponding space in each of said first and second brackets.

4,986,330

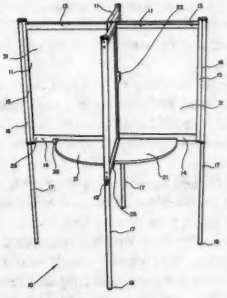
PRIVACY BOOTH

Patrick E. McGonagle, 46 St. John's Park, Buncrana Road, Londonderry, Northern Ireland

Filed May 30, 1989, Ser. No. 357,958

Int. Cl.^{5} A47G *5/00*

U.S. Cl. 160—135 **5 Claims**



1. A privacy booth comprising:

a plurality of partition members pivotably mounted together for movement from a storage position in which the parti-

tion members are in superimposed side-by-side relationship to an in-use position in which the partition members extend substantially radially away from a common vertical axis to define at least two separate compartments; a plurality of table tops pivotably connected to a respective one of the plurality of partition members and movable from a storage position in which the table top is folded against the partition member to an in-use position in which the table top extends between the adjacent ones of said plurality of partition members, wherein an area between adjacent ones of said plurality of partition members defines a compartment; and

means for dismantling at least one of said plurality of partition members into a storage position thereby removing a single compartment, wherein remaining ones of said plurality of partition members remain in an in-use position.

4,986,331

CLOSURE OPENABLE AND CLOSABLE BY A DRIVE FOR AN APERTURE, SUCH AS A DOOR OR GATE, COMPRISING INTERHINGED SLATS

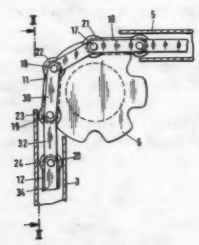
Gerda Henkenjohann, Verl, Fed. Rep. of Germany, assignor to Firma Johann Henkenjohann, Verl, Fed. Rep. of Germany

Filed Mar. 29, 1989, Ser. No. 329,990

Claims priority, application Fed. Rep. of Germany, Apr. 8, 1988, 3811704

Int. Cl.[5] E06B *3/38*

U.S. Cl. 160—201 **10 Claims**



1. A retractable closure for an opening, comprising

a plurality of hollow slats, spanning the width of said opening, hinged to each other throughout their lengths, by means of hinges between said slats,

locking means for securing the slats against longitudinal displacement attached to alternate ends of said slats, said locking means dimensioned to engage adjacent ends of said slats,

entraining means, fastened to said locking means, and coaxial with axes of said hinges between said slats,

a first pair and a second pair of guide rails, defining first and second planes, and spaced apart so as to receive said entraining means,

a link chain attached to said entraining means, said link chain comprising connecting links, said entraining means comprising the pivot pins of said link chain,

a pair of drive wheels in driving engagement with said entraining means, said drive wheels being located in the deflection zone between said first and second planes, and

means for securing said link chain against bending in a direction opposite to the direction of bending over said drive wheels, said securing means comprising a stop disposed on a first connecting link and an abutment which cooperates with said stop disposed on an adjacent connecting link.

4,986,332

FASTENING TRACK ASSEMBLY FOR FABRIC WALLCOVERINGS

Craig S. Lanuza, 2192 Channel Dr., Ventura, Calif. 93001, assignor to Craig S. Lanuza, Ventura, Calif.

Filed Aug. 9, 1990, Ser. No. 565,247

Int. Cl.[5] E06B *9/56*

U.S. Cl. 160—327 **3 Claims**

1. A fabric fastening system comprised of intermeshing track assemblies including, in combination:

(a) a first polyvinyl chloride extruded track one flat longitudinal side for contact with a flat wall surface to be covered with fabric, one opposing longitudinal edge of said flat longitudinal side having a set of longitudinal grooves followed downward by a longitudinal angled finger facing away from said wall surface, said longitudinal grooves and said longitudinal angled finger represent a first half of working jaws, a longitudinal barb located downward from said longitudinal angled finger facing outward from said wall surface, said longitudinal barb represents a first half of a positive locking catch, the opposite longitudinal edge of said track having a longitudinal finger facing outward from said wall surface, a slightly curved longitudinal barb located upward from said longitudinal finger, said longitudinal finger and said slightly curved longitudinal barb represent a positive locking slot.

(b) a second polyvinyl chloride extruded track having on one side a flat longitudinal face for direct contact with said fabric, top opposing longitudinal edge of said second extruded track having a downward angled longitudinal arm, a longitudinal concaved notch exits on top of the outermost tip of said downward angled longitudinal arm, said downward angled longitudinal arm and said longitudinal concaved notch represent a second half of a working jaw, a second longitudinal barb facing outward towards said wall surface positioned in relationship to said first longitudinal barb of said first track, said second longitudinal barb represents a second half of a positive locking catch, the opposite longitudinal edge of said second extruded track having a male mating barb facing outward towards said wall surface, whereby after securing said first extruded track with fastening means provided to said wall surface, said second extruded track can be connected by pressing said male mating barb into said positive locking slot, said first and second extruded tracks are pressed together, whereby said first and said second longitudinal barbs intermesh creating said positive locking catch, simultaneously said downward angled longitudinal arm and said longitudinal angled finger connect creating a first set of said working jaws and a fabric storage slot.

(c) a third polyvinyl chloride extruded track having the identical said flat longitudinal face as said second extruded track for contact with said fabric, an identical said second longitudinal barb facing outward towards said wall surface positioned in relationship to said first longitudinal barb, said second longitudinal barb represents a second half of a positive locking catch, an identical said male mating barb is positioned in relationship to said positive locking slot of said first track.

the opposing longitudinal edge of said third extruded track

having a longitudinal curved arm with longitudinal mating grooves positioned in relationship as to make contact with said longitudinal grooves of said first track, said longitudinal curved arm with said longitudinal mating grooves and said longitudinal grooves of said first extruded track represent a second set of said working jaws, the said third extruded track facilitates installation options of fabric to corners and edges, fabric is applied to perimeter of said wall surface on top of said longitudinal face of said interlocking track assemblies, excess fabric is allowed for the necessary salvage being tucked into said fabric storage slot, fabric is repeatedly stretched and tucked around said wall perimeter to create a tight flat appearance, said working jaws provide sufficient elasticity to allow for the opening and closing of said working jaws, whereby excess fabric can be tucked into said fabric storage slot, then provide sufficient tension at said working jaws to lock fabric into said fabric storage slot.

4,986,333

METHOD OF SUPPORTING A CORE IN A MOLD

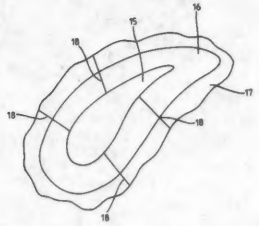
Frederick H. Gartland, Nottingham, England, assignor to Rolls-Royce, Plc, London, England

Filed Jan. 10, 1989, Ser. No. 295,368

Claims priority, application United Kingdom, Jan. 13, 1988, 8800686

Int. Cl.[5] B22C *9/04, 9/10*

U.S. Cl. 164—30 **5 Claims**



1. A method of locating and maintaining a core in fixed space relationship with the interior of a ceramic shell mold in the investment casting process for making a cast component, comprising the steps of:

encasing the core in wax,

inserting a plurality of recrystallized alumina pins through the wax encasing the core until said pins abut the core,

encasing the wax encased core in a ceramic slurry and hardening the slurry to form a ceramic shell mold and to fix the recrystallized alumina pins,

the fixed recrystallized alumina pins remaining intact during subsequent casting and solidification processes, thereby maintaining the core in an accurate location within the ceramic shell mold during the casting and solidification processes.

4,986,334

BOTTOM VERTICAL SLIDE ON A HORIZONTAL MOVABLE DIE OF A VERTICAL INJECTOR DIE CASTING MACHINE

Shen H. Bai, Toledo, Ohio, assignor to Farley, Inc., Chicago, Ill.

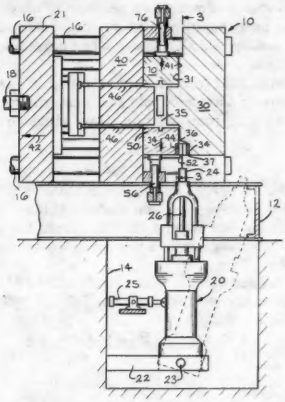
Filed Jun. 11, 1990, Ser. No. 535,662

Int. Cl.[5] B22D *17/12, 17/26, 17/30*

U.S. Cl. 164—312 **6 Claims**

1. Dies for a horizontal die casting machine with a vertical injector, said dies comprising a stationary die with a parting surface and a horizontal movable die with a parting surface adjacent the said parting surface of said stationary die, said vertical injector movable beneath said dies for injecting molten metal into said dies when said dies are closed, said injector having an axially upwardly movable shot sleeve at its upper end, the improvement comprising:

(A) a vertically movable slide in the lower parting surface of said movable die, said slide having an outwardly projecting portion with a half annular docking block in the outer end of said portion,



(B) a complementary half annular docking block in a recess in said parting surface of said stationary die for forming with said half docking block in said slide, a complete annular seat for said shot sleeve of said injector, and

(C) an outwardly tapered trough duct in said parting surface of said stationary die surrounding the two halves of said docking block, said duct conducting molten metal from said shot sleeve into said dies.

4,986,335

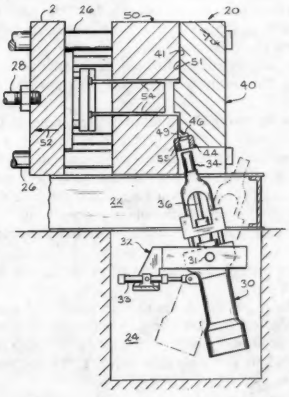
DIES FOR HORIZONTAL-VERTICAL DIE CASTING MACHINES

Byron W. Koch, Toledo, Ohio, assignor to Farley, Inc., Chicago, Ill.

Filed May 14, 1990, Ser. No. 522,794

Int. Cl.[5] B22D *17/12, 17/26, 17/30*

U.S. Cl. 164—312 **20 Claims**



1. Dies for a horizontal die casting machine with a vertical injector, said dies comprising a stationary die with a parting

surface, and a horizontally movable die with a parting surface adjacent said parting surface of said stationary die, said vertical injector moveable beneath said dies for injecting molten metal into said dies when said dies are closed, said injector having an axially upwardly movable shot sleeve at its upper end, the improvement comprising:

(A) a complete annular cylindrical docking block in said stationary die adjacent said parting surface of said stationary die near the lower portion of said stationary die, said block seating said shot sleeve when moved upwardly into said block, and

(B) a trough duct from the upper open end of said block in said parting surface of said stationary die for conducting molten metal from said shot sleeve into said dies.

4,986,336

TWIN-ROLL TYPE CONTINUOUS CASTING MACHINE

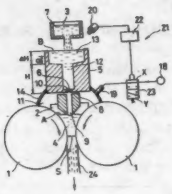
Hisahiko Fukase, Tokyo; Kunio Matsui; Akihiro Nomura, both of Yokohama, and Atsushi Hirata, Hiratsuka, all of Japan, assignors to Ishikawajima-Harima Heavy Industries Co., Ltd., Tokyo, Japan

Filed Jul. 25, 1989, Ser. No. 384,597

Claims priority, application Japan, Jul. 26, 1988, 63-184750; Sep. 9, 1988, 63-224507

Int. Cl.[5] B22D *11/06*

U.S. Cl. 164—415 **12 Claims**



1. A twin-roll type continuous casting machine for fabricating a metal sheet from molten metal, comprising:

a pair of rolls spaced from each other by a predetermined gap;

side weirs provided on each roll in the lateral direction of the roll;

a tundish for reserving the molten metal and supplying the molten metal toward the gap between the rolls, so as to form a melt pool on the upper side of the gap between the rolls and to fabricate the metal sheet through the gap between the rolls;

a pressurizing chamber formed between the rolls and the tundish for gas-pressurizing the melt surface of the melt pool;

means for detecting the level of molten metal in the tundish; and,

means responsive to the detecting means for maintaining the pressure on the melt pool substantially constant.

9. A twin-roll type continuous casting machine for fabricating a metal steel from molten metal, comprising:

a pair of rolls spaced from each other by a predetermined gap;

side weirs provided on each roll in the lateral direction of the roll;

a tundish for reserving the molten metal and supplying the molten metal toward the gap between the rolls, so as to form a melt pool on the upper side of the gap between the rolls and to fabricate the metal sheet through the gap between the rolls;

a feeder provided above the rolls and below the tundish for guiding the molten metal from the tundish toward the gap between the rolls;

a pressurizing chamber provided between the rolls and the tundish in order to pressurize the melt surface of the melt pool by a gas;

a gas pressure source for supplying a substantially constant pressure into the pressurizing chamber;

means for detecting the melt surface level in the tundish; and

control means for cutting off the supply of the gas pressure from the gas pressure source to the pressurizing chamber when the melt surface level detected by the detecting means is lowered below a predetermined level.

4,986,337

APPARATUS FOR GRAVITY-FEED CASTING WITH A LARGE NUMBER OF INGOT MOLDS OF METAL OF METAL BILLETS OF MULTIPLE DIAMETERS

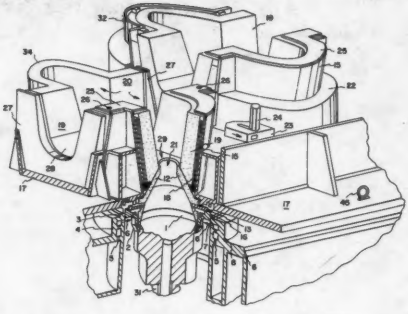
Roger Soulier, Voiron, France, assignor to Aluminium Pechiney, Paris, France

Continuation-in-part of Ser. No. 259,808, Oct. 19, 1988. This application Jan. 17, 1990, Ser. No. 466,637

Claims priority, application France, Nov. 13, 1987, 87 16298

Int. Cl.[5] B22D *11/00*

U.S. Cl. 164—420 **6 Claims**



1. A continuous casting apparatus for multiple gravity feed casting said apparatus comprising:

at least one row of ingot molds each provided with side and upper walls and a movable bottom;

a corresponding cooling cell disposed externally to and spaced from the side wall of each said mold each said mold resting freely on a corresponding cooling cell and bearing against the corresponding cell by way of a seal;

a feeder head having a base provided with an outwardly directed rim resting on the upper wall of each said mold by means of a seal;

a removable base plate disposed above said molds supporting ducts for feeding liquid material said base plate including a plurality of openings, each said opening communicating between a said duct and at least one said feeder head,

a removable housing provided on said base plate for each of said opening, each housing including one aperture for each feeder head with which the opening corresponding to the housing communicates, each said aperture being aligned with an opening and a feeder head which is engaged into the opening, the rim of the feeder head being fixed beneath the corresponding housings, said removable housing being separable from each other;

means fixing each said housing to said base plate; and

a plurality of interconnected refractory blocks fixed with respect to each of said housings forming said ducts and having apertures therein corresponding to the apertures in the housing and the openings in the base plate.

4,986,338

GAS VENTING ARRANGEMENT IN HIGH SPEED INJECTION MOLDING APPARATUS AND METHOD FOR VENTING GAS IN THE HIGH SPEED INJECTION MOLDING APPARATUS

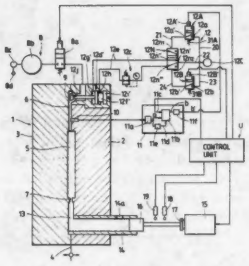
Noriyoshi Yamauchi; Hitoshi Ishida; Kazuaki Kawai, and Yasuyuki Mizukusa, all of Fuchu, Japan, assignors to Ryobi Ltd., Hiroshima, Japan

Filed Apr. 6, 1989, Ser. No. 334,373

Claims priority, application Japan, May 16, 1988, 63-64851[U]; Jun. 24, 1988, 63-157511

Int. Cl.[5] B22D *17/00*

U.S. Cl. 164—457 16 Claims



15. A method for venting gas in a high speed injection molding apparatus which includes a casting sleeve, mold halves defining a mold cavity therebetween, an injected molten metal being fed through the casting sleeve and molded within the mold cavity, the mold halves being formed with a gas vent passage in fluid communication with the mold cavity and positioned downstream with respect thereto, and a gas vent control valve disposed at a downstream end portion of the gas vent passage; the method comprising the steps of:

detecting molten metal by a detection member provided in the gas vent passage;

sending to a control circuit a first detection signal indicative of first detection of the first molten metal detected by the detection member;

generating a high voltage drive signal at the control circuit;

outputting the high voltage drive signal to an electromagnetic valve for its prompt change-over operation;

performing change-over operation of a pneumatically operated valve in response to the change-over operation of the electromagnetic valve;

supplying, through the pneumatically operated valve, a large volume of pneumatic pressure of a pneumatic source in response to the change-over operation of the pneumatically operated valve, to a valve driving cylinder connected to the gas vent control valve for closing the same.

4,986,339

PROCESS AND APPARATUS FOR CONTINUOUS SHEET CASTING BY TWIN ROLLS

Kenichi Miyazawa, Kawasaki, Japan, assignor to Nippon Steel Corporation, Tokyo, Japan

Filed Aug. 3, 1989, Ser. No. 388,800

Claims priority, application Japan, Aug. 3, 1988, 63-192758

Int. Cl.[5] B22D *11/06, 11/10*

U.S. Cl. 164—466 15 Claims

1. A continuous sheet casting process for producing cast sheets comprising the steps of

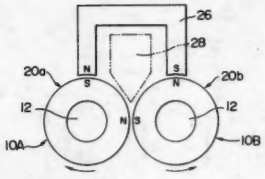
providing a pair of rolls positioned parallel to and rotating in opposite direction to each other, each of said rolls can be internally cooled and is constructed in a manner that a plurality of paramagnetic material zones and at least three ferromagnetic material zones are alternately combined in the direction of the roll axis,

causing all of the ferromagnetic material zones of the two rolls to be opposite to one another,

forming magnetic circuits, by the action of magnets positioned outside or inside the rolls, in two places arbitrarily selected in the direction of the roll axis between the ferromagnetic material zones and the magnets which are opposite to one another between the two rolls, continuously supplying molten metal to the gap defined between the rotating rolls while retaining the formed magnetic circuits, and

preventing the flow of molten metal to outside the magnetic fields in the direction of the roll axis by the magnetic fields generated between the opposite rolls in the two places, thereby controlling the casting width.

5. A twin roll type continuous sheet casting apparatus for producing cast sheets by continuously pouring molten metal into the space defined by a pair of opposite rolls positioned



parallel to each other and rolling the poured molten metal by causing it to solidify gradually, in which:

each of said rolls can be internally cooled and is constructed in a manner that at least four paramagnetic material zones and at least three ferromagnetic material zones extending along the full periphery of each roll are combined alternately and integrally in the direction of the roll axis, all of the ferromagnetic material zones of the two rolls positioned parallel to each other are opposite to each other,

at least two magnets are positioned outside or inside of the rolls which can magnetize the ferromagnetic material zones opposite to one another between the two rolls by forming a magnetic circuit between the ferromagnetic material zones in two places arbitrarily selected in the direction of the roll axis, and

a means for continuously supplying molten metal to the gap defined between the pair of rolls between the ferromagnetic material zones in two places selectively magnetized is Positioned above the two rolls.

4,986,340

METHOD FOR STIRRING AND/OR BRAKING OF MELTS AND A DEVICE FOR CARRYING OUT THIS METHOD

Jan E. Eriksson, Mörarp, Sweden, assignor to Aesa Aktiebolag, Västerås, Sweden

Continuation of Ser. No. 109,051, Oct. 16, 1987, abandoned. This application Jul. 30, 1990, Ser. No. 561,254

Claims priority, application Sweden, Oct. 20, 1986, 8604456

Int. Cl.[5] B22D *27/02*

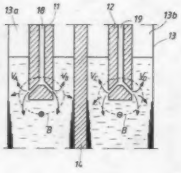
U.S. Cl. 164—468 9 Claims

1. A method of slowing down and spreading the non-solidified parts of tapping jets of molten materials flowing into a metallic melt in an open-bottomed mold from first and second spaced apart, downwardly-extending casting pipes, each of said casting pipes defining a flow channel through which molten material flows and a lower end having at least one orifice through which molten material flows as a tapping jet into said metallic melt, said method comprising positioning two iron cores which have first and second pole shoes at their opposite ends and which each have at least one coil from an

electrical circuit wrapped therearound at opposite ends of said casting mold such that the first pole shoes of said two iron cores are directed at the lower end of said first casting pipe and the second pole shoes of said two iron cores are directed at the lower end of said second casting pipe, and passing an electrical current through said electrical circuit such that a magnetic field created between corresponding pairs of said first and second pole shoes acts on the molten material passing through the flow channel of aid first and second casting pipes and causes each tapping jet from each of said first and second casting pipes to slow down and spread out as it moves through a said orifice and enters said metallic melt.

7. An apparatus for supplying molten material to a metallic melt in an open-bottomed mold, said apparatus comprising

first and second spaced apart casting pipes which extend downwardly into the metallic melt, each of said casting pipes defining a flow channel through which molten material flows and a lower end having at least one orifice through which molten material flows as a tapping jet into said metallic melt,



two iron cores positioned at opposite sides of said casting mold, each iron core having first and second pole shoes at opposite ends thereof, the first pole shoe of each of said two iron cores being directed at the lower end of said first casting pipe and the second pole shoe of each of said two iron cores being directed at the lower end of said second casting pipe,

at least one coil of an electrical circuit wrapped around each of said iron cores, and

means for supplying electrical current to said electrical circuits so as to generate a magnetic field between the corresponding first and second pole shoes of said two iron cores and thereby cause the magnetic field to act on the molten material passing through the flow channel of said first and second casting pipes and cause each tapping jet from each of said first and second casting pipes to slow down and spread out as it moves into the metallic melt in said casting mold.

4,986,341

PROCESS FOR MAKING NON-ORIENTED HIGH SILICON STEEL SHEET

Sadakazu Masuda; Fumio Fujita; Masamoto Kamata; Masahiko Yoshini; Takashi Arlizumi; Yuji Okami; Yoshikazu Takada, and Junichi Inagaki, all of Tokyo, Japan, assignors to Nippon Kokan Kabushiki Kaisha, Tokyo, Japan

PCT No. PCT/JP88/00488, § 371 Date Dec. 15, 1988, § 102(e) Date Dec. 15, 1988

PCT Filed May 23, 1988, Ser. No. 294,664

Int. Cl.[5] B22D *11/00*

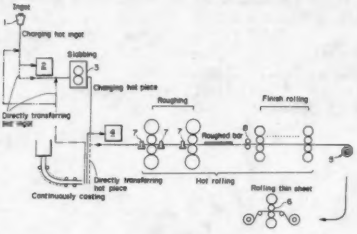
U.S. Cl. 164—477 **8 Claims**

1. A process for making non-oriented high Si steel sheet, comprising, making an ingot or continuously casting a piece of high Si steel composed of Si: 4.0 to 7.0 wt %, Al: not more than 2 wt %, Mn: not more than 0.5 wt %, C: not more than 0.2 wt %, P: not more than 0.1 wt %, and the rest being iron and inavoidable impurities;

introducing said solidified ingot or continuously cast piece as a slab into a slab heating furnace while the lowest-temperature part of said slab is not less than 600° C., heating said slab at a temperature of not more than 1250° C.;

rolling the slab at a temperature of not less than 600° C.;

introducing the slab into a hot rolling furnace while the lowest-temperature part of said slab is not less than 400° C., and sending the slab to a hot rolling process;



finish-rolling the slab such that the total rolling reduction at a temperature of not more than 900° C. is more than 30%, coiling the hot rolled steel at a temperature between 300° C. and 700° C., and rolling the hot rolled coil by a reverse mill at a temperature of not more than 400° C. to a thickness of not more than 0.5 m.

4,986,342

APPARATUS FOR HEATING AND COOLING LIQUIDS

Yair Meshulam, 13 Hatzanchanim Street, Rehovot, Israel

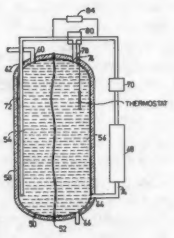
Division of Ser. No. 198,108, May 24, 1988, Pat. No. 4,911,228.

This application Feb. 9, 1990, Ser. No. 478,203

Claims priority, application Israel, Jan. 1, 1988, 85005

Int. Cl.[5] F25D *17/02;* **G05D** *23/00;* **F28F** *27/00*

U.S. Cl. 165—40 **2 Claims**



1. A heat transfer system for liquids , comprising:

a liquid container internally divided by an impervious flexible membrane into first and second liquid compartments, said first compartment including a first liquid inlet port for connection to a supply of liquid and a first liquid outlet port, and said second compartment including a second liquid inlet port and a second liquid outlet port;

a first liquid pathway extending between said second liquid outlet port and said second liquid inlet port;

means associated with said first liquid pathway for changing the level of heat energy in the liquid;

means associated with said first liquid pathway for generating liquid flow therealong from said second liquid outlet port to said second liquid inlet port;

a second liquid pathway extending between said first liquid outlet port and said first liquid pathway;

a thermostat associated with said second liquid compartment; and

a thermostatically controlled one way valve for permitting the passage of liquid from said first liquid compartment through said second liquid pathway and said first liquid

pathway to said means for changing the level of heat energy when the temperature of the liquid in said second liquid compartment exceeds a predetermined limit,

wherein there is also provided a presssure responsive bypass valve for permitting flow of liquid from a first location upstream of said theremostatically controlled valve to a second location downstream of said thermostatically controlled valve when the liquid pressure in said system falls below a predetermined value, and

wherein said means for changing the level of heat energy comprises means for cooling, said first liquid compartment containing uncooled liquid and said second liquid compartment containing cooled liquid.

4,986,343

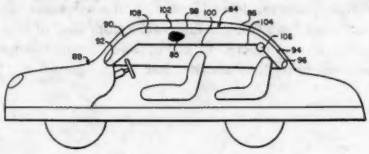
THERMAL INSULATING SHADE

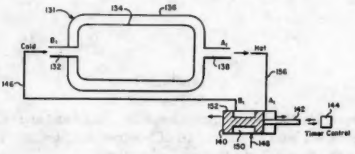
Peter Sing, 43 Donny Brook Rd., Scarsdale, N.Y. 10583

Continuation-in-part of Ser. No. 893,009, Aug. 1, 1986, Pat. No. 4,784,215. This application Jun. 9, 1988, Ser. No. 204,235

Int. Cl.[5] F24J *2/36*; E06B *3/94*; A47H *5/00*

U.S. Cl. 165—41 **19 Claims**





1. Thermal insulating shade for placement adjacent to and substantially overlaying the interior surface of an area to be insulated, the exterior surface of said area being exposed to variable weather conditions including sun's heat and winter's cold, the thermal insulating shade being both reversible and removable, and comprising:

envelope means comprising at least one pair of substantially parallelly disposed panels, at least one of said panels having a highly heat reflective surface on one side thereof, said at least one pair of panels being joined together around their peripheries to form said envelope means, said panels being shaped to conform in size and shape to the interior surface of the area to be insulated;

means for supporting said panels in spaced substantially parallel relationship to each other to provide space between each said panel pair;

means for releasably mounting said envelope means in substantially parallel spaced relationship to the interior surface of the area to be insulated, so that one side of the thermal insulating shade is insulated from the heat or cold prevailing on the other side thereof by reflection from said highly reflective surface as well as by the insulating effect of the air in said air space between said panels; and

means for introducing air under pressure into said air space between each of said at least one pair of said panels, said air introduction means comprising means for directing air to the thermal insulating shade alternately and sequentially to each of a pair of air access ports, said access ports communicating with said air space so that air introduced into one of said pair of access ports forces air previously introduced through the other of said access ports and contained in the shade to be expelled therefrom.

4,986,344

SUPPORT MEANS FOR THE MANIFOLD DUCTS OF A HEAT EXCHANGER

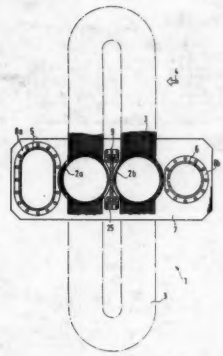
Karl Maier, Karlsfeld, Fed. Rep. of Germany, assignor to MTU Motoren und Turbinen- Union Munchen GmbH, Munich, Fed. Rep. of Germany

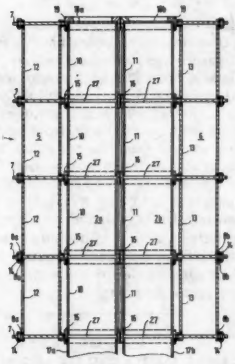
Filed Mar. 27, 1990, Ser. No. 500,515

Claims priority, application Fed. Rep. of Germany, Apr. 7, 1989, 3911257

Int. Cl.[5] F28F *9/00*

U.S. Cl. 165—67 **18 Claims**





1. A heat exchanger comprising two substantially parallel manifold ducts, a plurality of heat exchange tubes connected to said ducts and arranged in bundles extending axially of the ducts, each manifold duct comprising a plurality of axially aligned duct segments sealably connected to one another, and support frame means external of said ducts for guidably supporting each of the duct segments in the region of the ends thereof at which one duct segment faces the next, said support frame means comprising means for securing each duct segment at one end thereof to said support frame means, longitudinal support means extending parallel to said ducts, and a plurality of axially spaced support carriers to which said longitudinal support means is secured, said support carriers supporting said

manifold ducts in said regions where the ends of said duct segments face one another.

4,986,345

ROTARY HEAT EXCHANGER

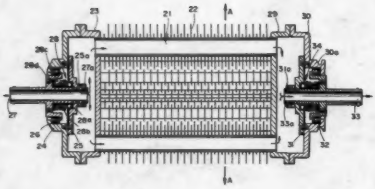
Masakazu Uemura, Yokosuka; Yoshinori Hirano, Yokohama, and Hitoshi Shimonosono, Yokosuka, all of Japan, assignors to Nissan Motor Co., Ltd., Japan

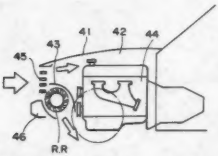
Filed Feb. 6, 1989, Ser. No. 306,567

Claims priority, application Japan, Feb. 9, 1988, 63-15165[U]

Int. Cl.[5] F01P *3/18;* F28F *5/04*

U.S. Cl. 165—86 **8 Claims**





5. A rotary heat exchanger comprising:

first and second rotatable bodies having inlet and outlet chambers, respectively, formed therein, said first and second rotatable bodies being disposed on a common axis and spaced from one another along said axis;

a plurality of conduits which are arranged in an annular pattern about said axis and lead from said first rotatable body to said second rotatable body and fluidly interconnect said inlet and outlet chambers; and

a plurality of fins, each of which is mounted on only one of said conduits, said fins being arranged so that the fins on one conduit interleave with and overlap the fins formed on the conduits located on either side of said one conduit and so that the fins on alternate conduits are aligned with one another, each of said fins having a shape which is essentially a sector of a ring.

4,986,346

MOVING BELT RADIATOR HEAT EXCHANGER

James B. Blackmon, Irvine; Edwin C. Cady, Orange, and Nelson E. Jones, Huntington Beach, all of Calif., assignors to McDonnell Douglas Corporation, Long Beach, Calif.

Filed Mar. 3, 1989, Ser. No. 318,757

Int. Cl.[5] B64G *1/50;* F28F *5/02*

U.S. Cl. 165—86 **12 Claims**

1. A heat rejection apparatus comprising:

means for accepting the flow of a heated coolant fluid, including

an incoming fluid transfer line and,

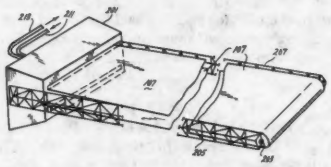
an outgoing fluid transfer line;

radiative means for radiating heat including

a radiator belt having a generally smooth surface and formed into a loop to facilitate continuous movement over said rotatable roller;

a remote rotatable roller having a first end and a second end, circularly surrounding the inner surface of said radiator belt, said remote roller creating tension in said radiator belt while urging said remote roller away from said rotatable roller; and,

transfer means, in rotatable circular contact with said radiative means and attached to said means, for accepting, for transferring heat from said heated coolant fluid to said



radiative means including a rotatable roller having a first end and a second end and a coaxial opening extending completely therethrough, said first end of said rotatable roller connected to and in fluid communication with said incoming fluid transfer line, said second end of said rotatable roller connected to and in fluid communication with said outgoing fluid transfer line.

4,986,347

SCRAPER

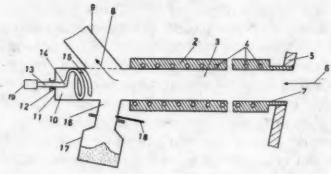
Michael Hirth, Mellingen; Joachim Jochum, and Christian Wieckert, both of Baden, all of Switzerland, assignors to Asea Brown Boveri Ltd., Baden, Switzerland

Filed May 30, 1989, Ser. No. 358,621

Claims priority, application Switzerland, May 27, 1988, 2034/88

Int. Cl.[5] B22B *19/14;* F28G *3/10*

U.S. Cl. 165—94 **14 Claims**



1. A tube carrying hot gases and/or vapors, and including an apparatus for the removal of residues from the inner wall of said tube, comprising:

a passage extending into a first end of said tube in an axial direction;

an axially extending shaft supported within said passage in an axially displaceable manner so that one end of said shaft is within said tube;

a discharge opening in said tube through which the residues may be removed;

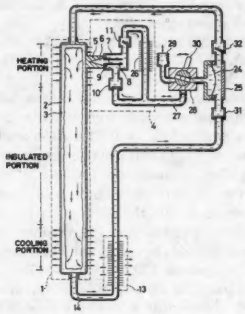
a helically wound metal scraper connected to said one end of said shaft; and means for driving said shaft such that said scraper is rotated in a corkscrew manner into said tube.

4,986,348

HEAT CONDUCTING DEVICE

Kenji Okayasu, 20-15, Mukai-machi, Gyoda-shi, Saitama-ken 361, Japan

Filed Dec. 22, 1988, Ser. No. 288,570
Claims priority, application Japan, Dec. 22, 1987, 62-324818
Int. Cl.[5] F28D *15/02*
U.S. Cl. 165—104.24 12 Claims



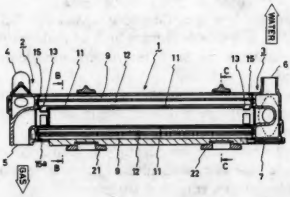
1. A heat conducting device comprising:
a heat drive pump for pumping a fluid by using growth and contraction of steam bubbles generated by heating a pump operating fluid;
a heat pipe having a heating portion for vaporizing a fluid and a cooling portion for condensing the fluid vaporized by said heating portion and conduit means for fluidly coupling an outlet of said cooling portion to an inlet of said heating portion, said cooling portion having a temperature lower than that of the heating portion, said heat drive pump being operatively coupled to said conduit means for pumping fluid therethrough, and further including a cooler operatively coupled to said conduit means for cooling the fluid condensed in said cooling portion of said heat pipe to a temperature lower than that of said cooling portion, said cooler being disposed between said cooling portion outlet and said operative coupling of said heat drive pump and said conduit means.

4,986,349

HEAT EXCHANGER

Takuro Ono, Chiryu, Japan, assignor to Aisin Seiki Kabushiki Kaisha, Kariya, Japan

Continuation of Ser. No. 248,926, Sep. 26, 1988, abandoned. This application Mar. 27, 1990, Ser. No. 500,104
Claims priority, application Japan, Sep. 30, 1987, 62-148210[U]
Int. Cl.[5] F28D *7/10*
U.S. Cl. 165—154 3 Claims



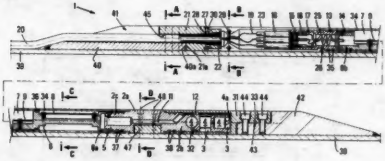
1. A heat exchanger comprising:
a cylindrical main body formed by extrusion molding;
a first connection having a first inlet for cooling water and a first outlet for high temperature fluid and connected to one end of the main body;
a second connection having a second inlet for the high temperature fluid and a second outlet for the cooling water and connected to an opposite end of the main body;
a plurality of cooling water passages formed in one piece with and as an integral part of the cylindrical main body, each of said cooling water passages extending axially along the main body and being connecting to the first inlet and the second outlet for the cooling water;
a high temperature fluid passage formed in the main body and positioned radially inwardly of said plurality of cooling water passages, said high temperature fluid passage extending axially along the main body and being connected to the first outlet and the second inlet for the high temperature fluid;
fin means for exchanging heat, said fin means being formed integrally and in one piece with said main body and said fin means extending into said high temperature fluid passage;
a first unitary sealing gasket axially compressed between and separate from the first connection and axially facing seal faces surrounding the cooling water passage and the high temperature fluid passage at the one end of the main body, the first gasket having an opening connecting the first inlet for the cooling water with the cooling water passage; and
a second unitary sealing gasket axially compressed between and separate from the second connection and axially facing seal faces surrounding the cooling water passage and the high temperature fluid passage at the opposite end of the main body, the second gasket having an opening connecting the second outlet for the cooling water with the cooling water passage.

4,986,350

DEVICE FOR THE SEISMIC MONITORING OF AN UNDERGROUND DEPOSIT

Jean Czernichow, Chatenay Malabry, France, assignor to Institut Francais du Petrole, Rueil Malmaison; Total Compagnie Francais des Petroles, Paris; Compagnie Generale de Geophysique, Massy; Service Nationale Dit: Gaz de France, Paris and Societe Nationale Elf Aquitaine, Courbevoie, all of, France

Filed Feb. 9, 1990, Ser. No. 477,503
Claims priority, application France, Feb. 9, 1989, 89 01796
Int. Cl.[5] E21B *47/00, 47/12;* G01V *1/00*
U.S. Cl. 166—65.1 14 Claims



5. A device for the seismic monitoring of a petroleum deposit the device being adapted to be installed in a bore hole equipped with a casing pipe held in position by cementing, the device comprising at least one signal receiving unit including sensor means and means for transferring signals delivered by the sensor means out of the bore hole, projecting protection and anchorage means fixed to an exterior of the pipe casing for defining an open housing means having each signal receiving unit embedded and fixed therein, each signal receiving unit comprises an elongate support assembly including a first cavity for accommodating said sensor means and at least a second cavity communicating with said first cavity and being adapted to accommodate an amplifying means for amplifying signals to

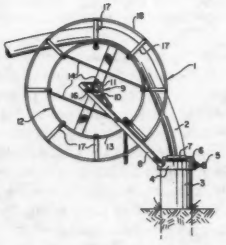
said sensor means, said elongate support assembly is disposed in an external case including end-pieces adapted to be fixed to said protection and anchorage means, wherein said support assembly comprises a body having said first and second cavities therein and a support means including cavity means for accommodating electronic cards, and wherein said body and the support means are fitted one in the other.

4,986,351

PORTABLE PUMP REMOVAL EQUIPMENT

Kenneth E. Bowers, Jefferson, Md., assignor to Marshall E. Wisner, Jefferson, Md.

Filed Dec. 5, 1989, Ser. No. 446,111
Int. Cl.[5] E21B *19/22*
U.S. Cl. 166—85 4 Claims



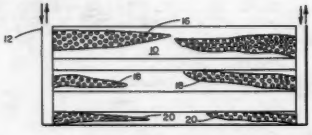
3. A pump removal equipment for pulling pipe and a pump from a well casing comprising clamping means for engagement with the well casing, a supporting frame fixedly mounted on said clamping means and extending outwardly from said clamping means, a wheel rotatably mounted on one end of said supporting frame, means on said wheel for releasably gripping the well pipe as the pipe is withdrawn from the well, and a plurality of rollers mounted on said clamping means for engagement with the well pipe.

4,986,352

INTERMITTENT STEAM INJECTION

Bassem R. Alameddine, Carrollton, Tex., assignor to Mobil Oil Corporation, Fairfax, Va.

Filed Sep. 28, 1989, Ser. No. 413,641
Int. Cl.[5] E21B *43/24, 43/30*
U.S. Cl. 166—263 8 Claims



1. A method to improve vertical sweep efficiency during intermittent steam injection into a multi-layered oil containing reservoir comprising:

a. injecting a substantially large volume of steam into said reservoir via at least one injector well into a lower level of said reservoir while at least one producer well is shut in which pressurizes the reservoir and propagates heat away from any induced fracture;

b. allowing the reservoir pressure to increase as steam injection continues until steam has entered each layer of the reservoir;

c. shutting in the injector well and allowing each layer of the reservoir to heat up so as to reduce the viscosity of oil contained in each layer; and

d. opening the producer well and producing oil to the surface thereby completing one cycle.

4,986,353

PLACEMENT PROCESS FOR OIL FIELD CHEMICALS

Charles R. Clark; Donald L. Whitfill, both of Ponca City, Okla.; D. Philip Cords, Newark, Del.; Edward F. McBride, and Harold E. Bellis, both of Wilmington, Del., assignors to Conoco Inc., Ponca City, Okla. and E. I. DuPont de Nemours and Company, Wilmington, Del.

Filed Sep. 14, 1988, Ser. No. 244,433
Int. Cl.[5] E21B *43/16, 41/02, 37/06*
U.S. Cl. 166—279 7 Claims

1. The process for the continuous release of an oil field chemical within a subterranean hydrocarbon bearing formation or wellbore penetrating such formation comprising:

(a) placing said oil field chemical in a solid polymeric matrix comprising the condensation product of hydroxyacetic acid monomer or hydroxyacetic acid co-condensed with up to 15 percent by weight of other hydroxy-, carboxylic acid-, or hydroxycarbonyl acid-containing moieties, said condensation product having a number average molecular weight of from about 200 to about 4000;

(b) dispersing particles of such solid polymeric matrix containing such chemical in a wellbore fluid which is a non-solvent for such polymeric particles and contained chemical; and

(c) introducing said wellbore fluid containing said particles into a wellbore or subterranean formation through a wellbore; then

(d) allowing water and temperature to degrade said particulate condensation products to form water soluble and oil soluble components; and thereby

(e) continuously releasing said chemical from said degraded particulate condensation products.

4,986,354

COMPOSITION AND PLACEMENT PROCESS FOR OIL FIELD CHEMICALS

Lisa A. Cantu, and Marvin E. Yost, both of Ponca City, Okla., assignors to Conoco Inc., Ponca City, Okla. and E. I. DuPont de Nemours and Company, Wilmington, Del.

Filed Sep. 14, 1988, Ser. No. 244,752
The portion of the term of this patent subsequent to Jan. 22, 2008, has been disclaimed.
Int. Cl.[5] E21B *43/16, 41/02, 37/06*
U.S. Cl. 166—279 9 Claims

1. A process for the continuous release of an oil field chemical within a subterranean hydrocarbon bearing formation or wellbore penetrating such formation comprising:

(a) placing said oil field chemical in a polymeric microcapsule comprising the condensation product of hydroxyacetic acid monomer or hydroxyacetic acid co-condensed with up to 15 percent by weight of other hydroxy-, carboxylic acid-, or hydroxycarboxylic acid-containing moieties, said product having a number average molecular weight of from about 200 to about 4000;

(b) dispersing such polymeric microcapsules containing such chemical in a wellbore fluid which at ambient conditions is a non-solvent for such polymeric microcapsules and contained chemical; and

(c) introducing said wellbore fluid containing said microcapsules into a wellbore or subterranean formation through a wellbore; then

(d) allowing water and temperature at formation conditions to degrade said microcapsules to form water soluble and oil soluble components; and thereby

(e) continuously releasing said chemical from said degraded microcapsules.

6. A composition comprising an oil field chemical incorporated in a polymeric microcapsule comprising the condensation product of hydroxyacetic acid monomer or hydroxyacetic

acid co-condensed with up to 15 percent by weight of other hydroxy-, carboxylic acid-, or hydroxycarboxylic acid- containing moieties, said product having a number average molecular weight of from about 200 to about 4000.

4,986,355

PROCESS FOR THE PREPARATION OF FLUID LOSS ADDITIVE AND GEL BREAKER

Burton M. Casad; Charles R. Clark; Lisa A. Cantu, all of Ponca City, Okla.; D. Philip Cords, Newark, and Edward F. McBride, Wilmington, both of Del., assignors to Conoco Inc., Ponca City, Okla.

Filed May 18, 1989, Ser. No. 353,947
Int. Cl.[5] E21B *33/138, 43/26*
U.S. Cl. 166—295 **7 Claims**

1. A process for reducing the permeability of a subterranean formation penetrated by a wellbore which comprises:

(1) combining a melted polymer of hydroxyacetic acid polymerized with itself or with other hydroxy-, carboxylic acid, or hydroxycarboxylic acid-moieties, and an organic liquid inert to the polymer,

(2) subjecting the resulting combination of melted polymer and organic liquid to high shear to form an organic liquid external dispersion of very fine particles of polymer in said organic liquid; and

(3) introducing said dispersion into said wellbore.

4,986,356

METHOD OF REMOVING POLYMER GELS FROM A PETROLEUM RESERVOIR

Thomas P. Lockhart, San Donato Milanese, and Giovanni Burrafato, Tavazzano, both of Italy, assignors to Enitricherche S.p.A. and AGIP S.p.A., both of Milan, Italy

Continuation of Ser. No. 283,740, Dec. 13, 1988, abandoned. This application Feb. 7, 1990, Ser. No. 477,120
Claims priority, application Italy, Feb. 5, 1988, 19318 A/88
Int. Cl.[5] E21B *37/00, 43/22*
U.S. Cl. 166—300 **13 Claims**

1. A method for removing from a petroleum reservoir natural or synthetic water-soluble polymer gels comprising an acrylamide polymer or copolymer or a polysaccharide of molecular weight between 200,000 and 40,000,000 crosslinked with a Cr^{+3} ion, characterised by bringing the gel into contact with an aqueous solution of an organic or inorganic complexing agent able to form with the polyvalent metal ion a coordination complex which is thermodynamically more stable than that which the metal ion forms with the polymer and thereby irreversibly degelling said polymer gel.

4,986,357

WELL TOOL HAVING A VARIABLE AREA HYDRAULIC ACTUATOR

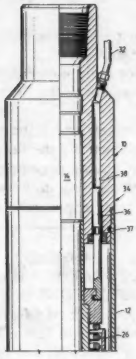
Ronald E. Pringle, 12030 White Cap, Houston, Tex. 77072

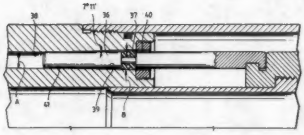
Filed Apr. 9, 1990, Ser. No. 506,313
Int. Cl.[5] E21B *34/10*
U.S. Cl. 166—319 **14 Claims**

1. In a subsurface well tool having a housing and a hydraulic piston and cylinder assembly actuator, the improvement in the actuator comprising,

said piston and cylinder assembly adapted to be connected to a hydraulic control line extending to the well surface, said cylinder assembly including an inlet connected to said hydraulic control line, and

said assembly having a cross-sectional area exposed to hydraulic fluid in the control line, said area increasing in one





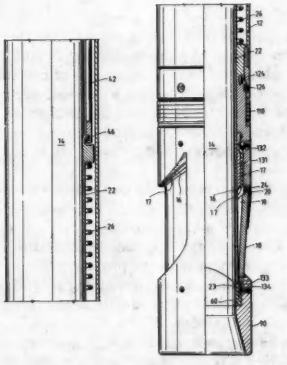
direction of movement of the assembly and decreasing in the opposite direction.

4,986,358

FLAPPER MOUNT FOR WELL SAFETY VALVE

Edgar D. Lueders, Stafford, and Brian A. Roth, Houston, both of Tex., assignors to Camco International Inc., Houston, Tex.

Filed Apr. 16, 1990, Ser. No. 509,531
Int. Cl.[5] E21B *34/10*
U.S. Cl. 166—321 **5 Claims**



1. A subsurface well safety valve for controlling the fluid flow through a well conduit comprising,

a housing having an axial bore therethrough, said housing including a one-piece flapper mount,

a flapper valve closure member movable between open and

closed positions relative to the valve seat and supported from the mount, said valve closure member being a sector of a cylinder having a concave surface which forms a sealing surface,

said valve seat having a seating surface contoured to coact with the sealing surface,

a flow tube telescopically movable in the housing for controlling the movement of the flapper valve closure member,

a mating downstop carried by the mount below and positioned for engagement by the flow tube, and

said flapper mount having opposing openings between the valve seat and the mating downstop, said openings sized for insertion of said flapper valve member.

4,986,359

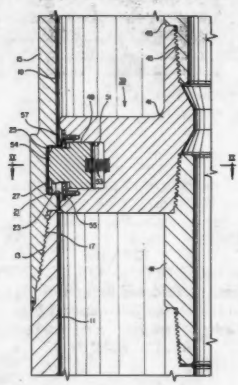
RELEASE APPARATUS AND METHOD FOR THREADED CONDUCTOR PIPE

Stephen A. Cromar, Aberdeen, and Gavin T. Reilly, Portlethen, both of Scotland, assignors to Vetco Gray Inc., Houston, Tex.

Filed Apr. 16, 1990, Ser. No. 509,989

Int. Cl.[5] E21B *19/16*

U.S. Cl. 166—340 **5 Claims**



1. An apparatus for breaking out a subsea threaded connection within a string of pipe, comprising in combination:

a connector joint formed on an end of one section of pipe, the connector joint having a threaded section;

a profile formed in the interior of the connector joint above the threaded section, the profile having an axially extending torque shoulder and a downward facing lifting shoulder;

a torque tool having a body and adapted to be lowered on a string of conduit through the pipe to the connector joint;

at least one dog mounted to the body;

means for urging the dog radially outward from the body into engagement with the profile;

the dog having an axially extending side for engaging the torque shoulder to unscrew the connector joint when the conduit is rotated; and

the dog having an upward facing lifting surface for engaging the lifting shoulder of the profile to pick up the string of pipe above the connector joint by lifting the conduit.

4. A method for breaking out a subsea connector joint within a string of pipe, comprising in combination:

forming a profile in the interior of the connector joint with an axially extending torque shoulder and a downward facing lifting shoulder;

providing a torque tool with at least one dog;

lowering the torque tool on a string of conduit through the pipe to the connector joint;

urging the dog radially outward from the body into engagement with the profile;

rotating the string of conduit until the dog contacts the torque shoulder;

picking up the string of conduit by causing the dog to engage the lifting shoulder; and

applying torque to the string of conduit, which transmits through the dog to the torque shoulder to release the connector joint.

4,986,360

SYSTEM FOR HANDLING REELED TUBING

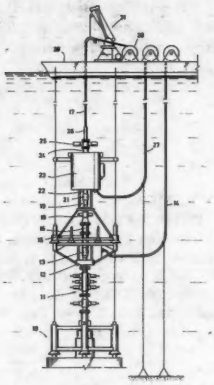
Tibor Laky, Dallas, and Stewart H. Fowler, Jr., The Colony, both of Tex., assignors to Otis Engineering Corporation, Dallas, Tex.

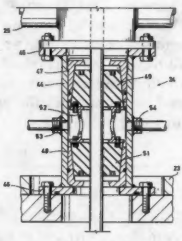
Division of Ser. No. 293,640, Jan. 5, 1989, Pat. No. 4,923,005.

This application Jan. 29, 1990, Ser. No. 471,788

Int. Cl.[5] E21B *19/22, 33/08*

U.S. Cl. 166—351 **6 Claims**





1. A tubing handling system for underwater service comprising:

tubing injector for moving tubing through a wellhead;

a fluid confining enclosure for said injector;

an upper stripper secured to the top of said enclosure;

said stripper including:

a housing,

upper and lower confronting cup-shaped receptacles in said housing,

resilient seals in each receptacle,

a bore through each receptacle and seal for receiving a tubing,

holding means between said resilient seals holding them in engagement with said receptacle and with a tubing to seal therewith, and

fluid relief ports in said housing between said receptacles to exhaust fluid from said housing.

4,986,361

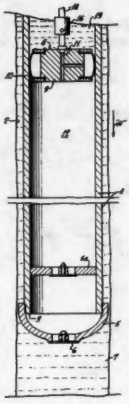
WELL CASING FLOTATION DEVICE AND METHOD

Mark D. Mueller, Santa Maria, Calif.; Frank Jones, Balikpapan, Indonesia; Julio Quintana, Bakersfield, Calif.; Keaneth E. Ruddy, Houston, Tex., and Michael Mims, Bakersfield, Calif., assignors to Union Oil Company of California, Los Angeles, Calif.

Filed Aug. 31, 1989, Ser. No. 401,086

Int. Cl.[5] E21B *33/10*

U.S. Cl. 166—381 **33 Claims**



1. An apparatus useful in installing a string of joined pipe sections from a surface into a well bore containing a first liquid, said apparatus comprising:

a pipe string portion, one end of said string portion forming one end of an air filled flotation cavity within the string;

a slidable member sealing and forming the other end of the flotation cavity, the slidable member having a passageway for conducting air out of the flotation cavity and liquid into the flotation cavity;

a plug sealing the passageway;

one or more first shear pins attaching the plug to the sliding member; and

one or more second shear pins attaching the sliding member to the pipe string.

4,986,362

RUNNING TOOL FOR USE WITH REELED TUBING AND METHOD OF OPERATING SAME

Charles W. Pleasants, 4008 Windy Crest Dr., Carrollton, Tex. 75007

Filed Dec. 8, 1989, Ser. No. 417,282

Int. Cl.[5] E21B *23/02*

U.S. Cl. 166—382 **22 Claims**

1. A running tool for connection relative to reeled tubing for actuating a tubular locking device in a wellbore, said running tool comprising:

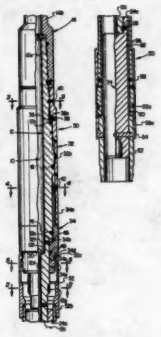
(a) a mandrel assembly defining a bore and adapted for connection to an end section of said reeled tubing for introducing fluid into said bore;

(b) piston means extending over a portion of said mandrel assembly in engagement with said locking device;

(c) connecting means connecting said piston means relative to said mandrel assembly;

(d) cooperating shoulders formed on said mandrel assembly and said piston means for defining a fluid chamber; and

(e) passage means connecting said mandrel assembly bore to said fluid chamber for establishing fluid pressure in said fluid chamber to exert oppositely directed forces on said shoulders, respectively;



(f) said connecting means being constructed and arranged to respond to a predetermined fluid pressure in said fluid chamber to release said connection between said piston means and said mandrel assembly and permit axial movement of said piston means relative to said mandrel assembly to actuate said locking device.

4,986,363

FIRE FIGHTING PROCESS AND USE OF THE METHOD

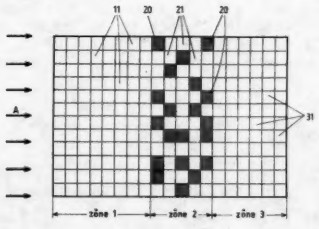
Jean Nahmiaj, Paris, France, assignor to Cereberus Guinard, Buc, France

Filed Jul. 26, 1988, Ser. No. 224,574

Claims priority, application France, Jul. 30, 1987, 87 10803

Int. Cl.[5] A62C *2/00, 3/02*

U.S. Cl. 169—46 **13 Claims**



1. A method of preventing the spread of fire comprising the steps of:

defining a combustible area having substantially continuous combustible material;

dividing said combustible area into three zones, a first zone and a second zone having a first shared border and a third zone and said second zone having a second shared border;

dividing said second zone into a plurality of site units, said plurality being greater in quantity than 150 site units;

defining a threshold percentage of non-propagative site units necessary to halt fire propagation through said second zone, the percentage of said plurality which are non-propagative site units being a percentage greater than the threshold percentage, but less than 100%, and said non-

propagative site units being dispersed within said second zone; and

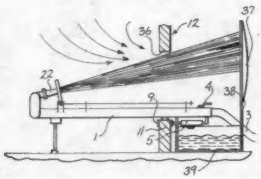
treating said non-propagative site units such that said units do not burn readily whereby a fire front will not propagate to said second shared border.

4,986,364

DUAL PURPOSE FIRE FIGHTING AND VENTILATION APPARATUS

Thomas W. Clark, 1108 S. Oneida Ave., Rhinelander, Wis. 54501

Filed Dec. 4, 1989, Ser. No. 445,454
Int. Cl.[5] A62C *3/14*
U.S. Cl. 169—48 **17 Claims**



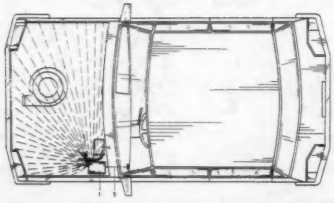
1. A dual purpose fire fighting and ventilation apparatus, comprising a rigid conduit having an inlet end to be connected to a source of water under pressure and having an outlet end, a nozzle having a discharge outlet, first mounting means for mounting said nozzle in said outlet end for movement in a generally vertical plane, first adjusting means for moving said nozzle in said plane from a first position where said outlet faces toward said inlet end to a second position where said outlet faces away from said inlet end first support means for supporting said conduit in a fixed position with respect to an opening in a building and comprising clamping means to engage a portion of the building adjacent said opening, and means activated by water pressure in said conduit for operating said clamping means.

4,986,365

AUTOMATIC FIRE EXTINGUISHER SYSTEM FOR A VEHICLE

Kuo-Chen Shieh, No. 10, Alley 1, Lane 92, Kuangchow Street, Taipei, Taiwan

Filed Mar. 27, 1989, Ser. No. 328,865
Int. Cl.[5] A62C *35/12*
U.S. Cl. 169—60 **7 Claims**



1. An automatic fire extinguisher system for a vehicle comprising:

(a) a contained source of pressurized fire extinguishing material;

(b) a rupturable valve means for controlling the discharge of the extinguishing material from the contained source thereof;

(c) inertial force operated actuating means for rupturing the valve means to discharge the extinguishing material in the event of vehicle collision, the actuating means including a slidable impact member provided with a sharpened end for rupturing the valve means;

(d) a bottom plate, a plurality of tabs extending upwardly from the bottom plate for slidably supporting the impact member, and a weight member connected to the impact member; and

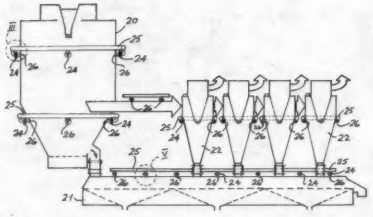
(e) a first elastic means connecting a first tab to the impact member for permitting the sliding movement thereof only when a predetermined inertial force is realized, the second elastic means connected to a second tab and disposed in engagement with the impact member to secure same in a fixed position after the impact member has ruptured the valve means.

4,986,366

METHOD AND APPARATUS FOR SUPPRESSING EXPLOSIONS AND FIRES

Michael O. O'Connell, Knockaneady, Ballineem, County Cork, Ireland

Continuation of Ser. No. 172,817, Mar. 25, 1988, abandoned. This application Jul. 19, 1989, Ser. No. 382,049
Claims priority, application Ireland, Mar. 25, 1987, 770/87; May 7, 1987, 1129/87; Jun. 24, 1987, 1673/87; Sep. 18, 1987, 2524/87
Int. Cl.[5] A62C *35/00*
U.S. Cl. 169—66 **19 Claims**



1. An explosion suppression apparatus for suppressing an explosion in an enclosure, the apparatus being responsive to explosive conditions, the apparatus comprising:

static reservoir means for containing pressurised water at a pressure substantially above atmospheric pressure;

heating means for heating the water in the static reservoir means without adding any water to the static reservoir means, said heating means having said water to substantially increase the liquid heat content of the water, the static reservoir means having an outlet means through which hot pressurised water is delivered to an enclosure;

valve means for closing the outlet means, the valve means having an inlet side which is in direct contact with the hot pressurized water in the reservoir;

sensing means for detecting said explosion conditions;

actuating means, responsive to said sensing means, for opening the valve means in response to fire or explosion conditions occurring in the enclosure to introduce the pressurised hot water from the static reservoir means into the enclosure at a pressure higher than that in the enclosure, to suppress an explosion in the enclosure and to prevent re-ignition,

a portion of the heat content imparted by heating the pressurized hot water being converted into discharge potential energy and kinetic energy to discharge the pressurized hot water from the reservoir means; and

a further portion of the heat content imparted by heating the pressurized hot water being converted into additional potential and kinetic energy on introduction into the lower pressure enclosure causing a secondary increase in velocity and fragmentation into fine particles which by

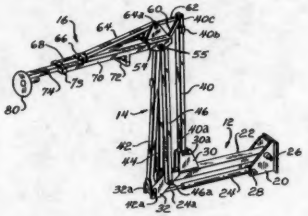
virtue of their elevated temperature substantially instantaneously absorb heat in the enclosure forming a vapour cloud and flash steam to reduce the oxygen concentration in the enclosure to prevent re-ignition.

4,986,367

FOLDING ROW MARKER

Jon E. Kinzenbaw, Williamsburg, Iowa, assignor to Kinze Manufacturing, Inc., Williamsburg, Iowa

Filed Dec. 4, 1989, Ser. No. 445,048
Int. Cl.[5] A01B *69/02*
U.S. Cl. 172—126 **16 Claims**



16. A row marker attached to an end of a toolbar member for providing an indication of proper lateral positioning of said toolbar relative to rows of crops, said row marker comprising:

a first inner section pivotally coupled to an end of the toolbar and including an inner mounting bracket on a distal end thereof;

a second intermediate section pivotally coupled to said first section by means of said inner mounting bracket;

a third outer section pivotally coupled to said second section and having a marker element on a distal end thereof;

displacement means including a hydraulic ram coupled to the toolbar member and to said inner mounting bracket for pivotally moving said first and second sections between an extended, use position and a folded, non-use position; and

linkage coupling said first, second and third sections for allowing said marker element to follow ground contour when the row marker is in the extended, use position and for pivotally displacing and maintaining said third section under a positive force in a tightly folded position relative to said second section when the row marker is in the folded, non-use position.

4,986,368

PLANTING APPARATUS

John P. Underwood, 42 W. Vogel, Phoenix, Ariz. 85021, and Dan B. Poole, 14645 N. 15th Ave., Phoenix, Ariz. 85023

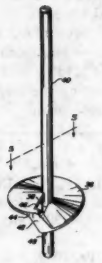
Filed Nov. 14, 1988, Ser. No. 270,623
Int. Cl.[5] E21B *10/44*
U.S. Cl. 172—394 **3 Claims**

1. An apparatus for boring planting holes in the ground in an environment which may contain submerged conduits, hoses, and the like, said apparatus comprising:

an elongate shank having first and second ends;

a spiral blade fixedly coupled to said shank proximate said first end, said spiral blade having an outer periphery, a trailing edge, and a cutting edge; and

first means proximate said cutting edge for protecting said submerged conduits, hoses and the like, said first means including a guard member extending from a first portion of said outer periphery adjacent said cutting edge to a



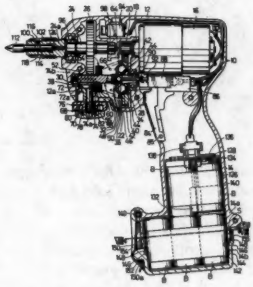
second portion of said outer periphery adjacent said trailing edge.

4,986,369

TORQUE ADJUSTING MECHANISM FOR POWER DRIVEN ROTARY TOOLS

Fusao Fushiya, and Michio Okumura, both of Anjo, Japan, assignors to Makita Electric Works, Ltd., Anjo, Japan

Filed Jul. 10, 1989, Ser. No. 377,156
Claims priority, application Japan, Jul. 11, 1988, 63-91644[U]; Jul. 11, 1988, 63-91646[U]; May 25, 1989, 1-60860[U]
Int. Cl.[5] B23Q *5/00*
U.S. Cl. 173—12 **4 Claims**



1. A power driven rotary tool comprising:

a tool housing;

an electric motor mounted within said tool housing and having an output shaft;

a first clutch member operatively connected to the output shaft of said electric motor;

a spindle rotatably mounted in said tool housing and having a tool bit removably secured to the front end thereof;

a torque adjusting mechanism for adjusting driving torque to be transmitted to said spindle of the tool to a fixed value;

said torque adjusting mechanism including a second clutch member operatively connected to said spindle and shiftable between a first position in which said second clutch member is in driving engagement with said first clutch member and a second position in which said second clutch member is in slipping engagement with said first clutch member;

biasing means for normally biasing said second clutch member into driving engagement with said clutch member;

control means disposed in said tool housing for smoothly adjusting the biasing force of said biasing means to a

discrete biasing value within a continuous range of design biasing force values;

manually-adjustable operating means including an adjusting knob operable from outside of the tool for operating said control means and for setting a desired maximum transmission torque as determined by setting and reference positioning indicia on said knob and tool housing; and

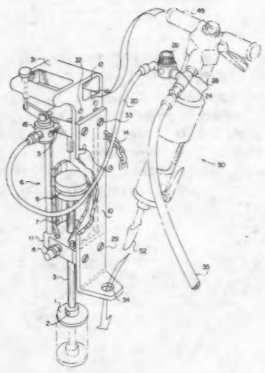
positioning means for holding said control means in an operative position adjusting the biasing force of said biasing means at said discrete value.

4,986,370

PNEUMATIC HAMMER LIFT

John Johnson, deceased, late of Greenville, S.C., and by Henryka Johnson, heiress, 350 Fairforest Wax, Apt. #2308, Greenville, S.C. 29607

Filed Jan. 19, 1989, Ser. No. 299,317
Int. Cl.[5] E21C *9/00*
U.S. Cl. 173—31 **4 Claims**



1. A pneumatic lift attachment for a pneumatic jack hammer for applying an upward force to said jack hammer, the pneumatic lift attachment comprising:

a housing, defining an air cylinder;

a piston, housed within said air cylinder;

a piston rod, attached to said piston;

a metal foot, attached to said piston rod;

a lift plate attached to said housing to support said jack hammer;

a three-way air valve coupled to said housing in communication with said air cylinder;

means defining a holding slot attached to said housing wherein a handle to said jack hammer be secured within said holding slot;

a tee coupling attached to said jack hammer;

an air pressure adjustment valve communicating with said tee coupling;

a hose which attaches said air pressure adjustment valve to said three-way air valve;

an air port, with filter, coupled to said housing;

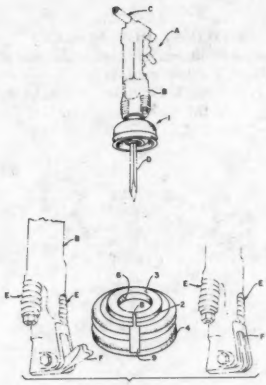
wherein, said lifting attachment operates when said air cylinder admits air from three-way valve, forcing said piston rod to be displaced from housing, thereby simultaneously lifting said housing carrying said lift plate and said supported jack hammer away from said metal foot, thereafter, said three-way valve releases pressure from the cylinder allowing piston to reenter housing, lowering said housing carrying said lift plate and said jack hammer until said chisel is in contact with the ground.

4,986,371

SAFETY DEFLECTOR FOR AIR HAMMER AND CONCRETE BREAKER

Wayne L. Lowe, 72 Virginia St., Cottage Hills, Ill. 62018

Filed Jan. 8, 1990, Ser. No. 461,738
Int. Cl.[5] B25D *17/10*
U.S. Cl. 173—171 **4 Claims**



1. A safety deflector for an apparatus in the category of an air hammer and concrete breaker, said apparatus being of the type having an elongated housing with an operating handle provided at its upper end, and a removable chisel provided at its lower end, the improvement comprising, a shield for mounting upon said housing, said shield having a neck portion disposed for securement upon said housing above its chisel, and a flaring portion integral with said neck portion and extending outwardly to function as a shield to prevent and intercept the upward movement of dirt, dust, broken chisel parts, and rock or concrete as the apparatus and chisel are in usage, said flaring portion of the shield being angled downwardly, and configured into a bell shape, said shield being formed of resilient material, there being a slot formed through the said shield and extending upwardly into its neck portion, for opening at the top of the shield, to provide clearance for application of said shield to the apparatus housing upon installation, and a clamp securing around said neck portion of said shield to fit it to the apparatus upon its installation.

4,986,372

ELECTRICAL CABLE WITH SPIRALLY WRAPPED WIRES

Robert C. Ganssle, Huntington, Conn., assignor to Hubbell Incorporated, Orange, Conn.

Filed Sep. 12, 1989, Ser. No. 406,332
Int. Cl.[5] H01B *7/22*
U.S. Cl. 174—106 SC **41 Claims**

40. A method of making an electrical cable, comprising the steps of

extruding a layer, composed of a first material, about an insulated electrical conductor,

extruding and bonding a plurality of strips, composed of a second material, which is different from the first material onto the layer, and

spirally wrapping a plurality of wires about the layer and the strips with sufficient tension to partially embed the wires into the strips.

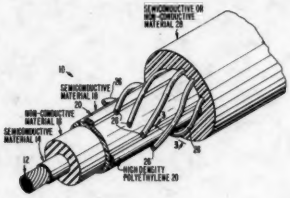
41. An electrical cable, the combination comprising;

an insulated electrical conductor;

a layer overlying said conductor and being composed of a first material;

a plurality of strips overlying said layer, composed of a

second material which is different from said first material, and fused to said layer; and



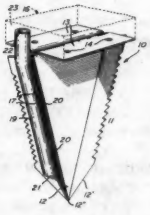
a plurality of wires spirally wrapped about said layer and said strips, and partially embedded into said strips.

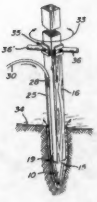
4,986,373

POST HOLE DIGGER

Guy Charland, Lavaltrie, and Robert Beaudoin, Mascouche, both of Canada, assignors to Les Industries L.T.A. Inc./L.-T.A. Industries Inc., St-Laurent, Canada

Filed Oct. 16, 1989, Ser. No. 422,080
Int. Cl.[5] E21B *10/42, 10/60;* E02D *7/24*
U.S. Cl. 175—21 **9 Claims**





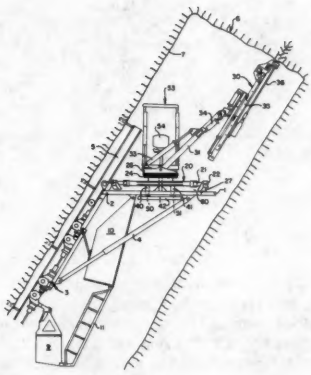
1. A post hole digger comprising a boring implement having a piercing free end and an attachment means at an opposed end for securement to a bottom end of a post to be secured in the ground, said implement having a tapered body section with a projecting serrated edge on opposed sides thereof, said serrated edges extending angularly from a common longitudinal plane and in opposed planar angular directions, there being a pair of said serrated edges in each said opposed sides, each edge of said pair extending in diverging angular planes, and conduit means secured to said implement to direct a liquid flow in the direction of said piercing free end.

4,986,374

APPARATUS FOR DRIVING AN UPWARDLY DIRECTED SHAFT IN ROCK

Ingemar Niemi, Malmberget, and Lars-Erik Andersson, Gällivare, both of Sweden, assignors to Gruvprodukter I Gallivare AB, Gallivare, Sweden

PCT No. PCT/SE88/00441, § 371 Date Feb. 28, 1990, § 102(e) Date Feb. 28, 1990, PCT Pub. No. WO89/02025, PCT Pub. Date Mar. 9, 1989
PCT Filed Aug. 29, 1988, Ser. No. 466,403
Claims priority, application Sweden, Aug. 31, 1987, 8703370
Int. Cl.[5] E21B *7/00, 41/00*
U.S. Cl. 175—86 **5 Claims**



1. Apparatus for driving an upwardly directed shaft in rock, thereby providing an increasingly taller shaft having a shaft wall, comprising:

a guide rail for mounting into the shaft wall so as to extend upwards along the shaft;

a platform vertically adjustably mounted to the guide rail for selectabel fixation at a desired height in the shaft;

a drilling unit including leg means which are movable between an extended position in which outer end portions thereof engage the shaft wall for supporting the drilling unit from the shaft wall substantially independently of the platform, and a retracted position in which the outer end portions of the leg means are sufficiently withdrawn from engagement with the shaft wall that the drilling unit is supported on the platform for vertical movement in the shaft as the platform is adjusted so as to become differently selectively fixed at a desired height in the shaft;

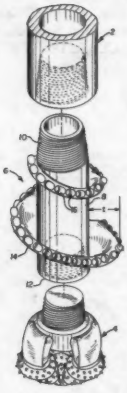
said drilling unit further including a drilling machine for cutting rock above said platform for increasing said shaft in height, and means supporting said drilling machine on said leg means, whereby, for preventing the drilling machine, when being operated from transmitting vibrations through said supporting means and said leg means to said platform and via said platform to said guide rail, after said platform has being adjusted in height to place said drilling machine at a level suitable for a cutting operation to begin, said leg means may be moved from said retracted position to said extended position, and said platform vertically adjusted to open a gap between said platform and said drilling unit.

4,986,375

DEVICE FOR FACILITATING DRILL BIT RETRIEVAL

Thomas P. Maher, R.D. #1, Box, 61, U.S. Rte. 22, New Alexandria, Pa. 15670

Filed Dec. 4, 1989, Ser. No. 445,286
Int. Cl.[5] E21B *17/22, 12/00*
U.S. Cl. 175—323 3 Claims



1. Apparatus for facilitating retrieval of a drill bit from a formation, said apparatus comprising:

a cylindrical member having a first threaded end adapted for attachment to a drill string and a second threaded end adapted for attachment to a drill bit, both of said ends being threaded in a common direction;

helical means secured to and radially outwardly projecting from the periphery of said cylindrical member, said helical means traversing a helical path about said cylindrical member in a direction opposite to said common direction; and

a plurality of cutting members attached to and extending radially and outwardly from the periphery of said helical means, each cutting member having a cutting surface facing partially upwardly in the direction of the helical means, said cutting members serving to cut the formation during a retrieving trip of the drill string to facilitate retrieval of the drill bit from the formation.

4,986,376

WEIGH PLATE QUICK RELEASE MOUNT

Richard E. Cone, Cambridge, Ohio, assignor to NCR Corporation, Dayton, Ohio

Filed Dec. 1, 1989, Ser. No. 444,353
Int. Cl.[5] G01G *21/22, 21/28*
U.S. Cl. 177—128 6 Claims

1. An apparatus for weighing an article comprising:

a first support member;

support means mounted on said first support member including a plurality of first apertures;

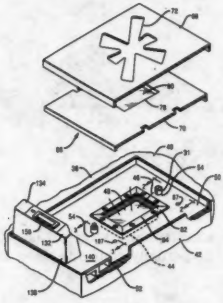
signal generating means including first and second load beam members secured to said support means;

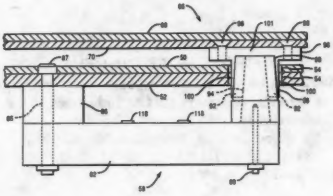
said load beam members each including a second support member extending through one of said first apertures to a position above said load beam members:

cover means removably mounted on each of said second support members for supporting an article to be weighed;

said second support member of the first load beam including a truncated end portion; and

a connecting member secured to the cover means including an engaging portion positioned on said truncated end





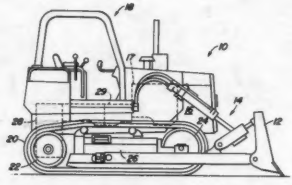
portion preventing any movement of the cover assembly on the load beam cells.

4,986,377

BELTED CRAWLER HAVING AUXILIARY DRIVE

Kevin J. Moriarty, Davenport, Iowa, assignor to Deere & Company, Moline, Ill.

Continuation-in-part of Ser. No. 169,528, Mar. 17, 1988, Pat. No. 4,942,934. This application Jul. 7, 1989, Ser. No. 376,732
The portion of the term of this patent subsequent to Jul. 24, 2007, has been disclaimed.
Int. Cl.[5] B62D *11/04, 55/04*
U.S. Cl. 180—6.5 35 Claims



1. A crawler vehicle comprising:

a frame;

a power unit secured to the frame;

a main drive wheel connected to the frame;

an auxiliary drive wheel connected to the frame;

an endless belted track operatively engaging both drive wheels for propelling said vehicle;

a transmission operatively coupling the power unit to the main drive wheel for driving the main drive wheel at a first speed; and

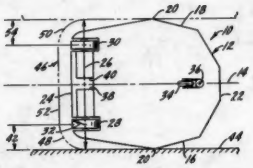
means for driving the auxiliary drive wheel at a second speed that is different than the first speed.

4,986,378

MACHINE CONFIGURATION AND METHOD FOR STEERING A VEHICLE AWAY FROM A WALL

Joseph G. Kasper, Golden Valley, Minn., assignor to Tennant Company, Minneapolis, Minn.

Filed Mar. 6, 1989, Ser. No. 319,355
Int. Cl.[5] B62D 11/02
U.S. Cl. 180—6.48 17 Claims



16. A vehicle capable of maneuvering away from a wall without hitting the wall when the vehicle is initially traveling parallel to the wall and as close as possible to the wall, comprising:

a frame defining a longitudinal axis and including first and second side members connected by front and rear members;

first and second drive wheels mounted on the frame near the rear member, the rotational axes of the first and second drive wheels being fixed in perpendicular relation to said longitudinal axis, the first and second drive wheels being positioned such that each has an inset line at least as long as the long radius of the drive wheel from the center of which the inset line is measured;

at least one forward caster wheel mounted on the frame near the front member;

first and second drive means individually driving the first and second drive wheels respectively;

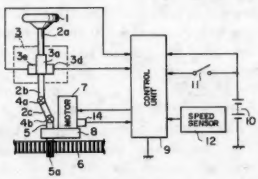
the rear member of the frame being disposed within an envelope defined by a first arc described by swinging a radius equal to the inset line of the first drive wheel outwardly and rearwardly about a vertical axis through the center of said first drive wheel, by a second arc described by swinging a radius equal to the inset line of the second drive wheel outwardly and rearwardly about a vertical axis through the center of said second drive wheel, and by a rear vertical plane tangent to the two arcs.

4,986,379

MOTORIZED POWER STEERING APPARATUS

Mitsuharu Morishita, Himeji, Japan, assignor to Mitsubishi Denki Kabushiki Kaisha, Tokyo, Japan

Filed Sep. 18, 1989, Ser. No. 408,335
Claims priority, application Japan, Sep. 28, 1988, 63-243214
Int. Cl.[5] B62D 5/04
U.S. Cl. 180—79.1 6 Claims



1. A motorized power steering apparatus for a vehicle comprising:

torque sensing means for generating an output voltage proportional to a steering torque exerted by a driver of the vehicle;

a motor for generating an auxiliary steering force;

motor control means for controlling the output torque of the motor in accordance with the output voltage of the torque sensing means, said motor controller comprising power switching elements;

temperature sensing means for sensing a temperature which is dependent on the motor current, wherein said temperature sensing means comprises means for sensing the temperature of the power switching elements and the temperature of the motor; and

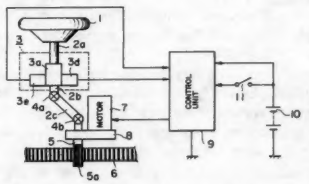
current limiting means for limiting the motor current to a current limit which decreases as the sensed temperature increases, wherein said current limiting means comprises means for cutting off the current to said motor at a current limit which decreases as either of the sensed temperatures increases.

4,986,380

MOTORIZED POWER STEERING APPARATUS

Mitsuharu Morishita, Himeji, Japan, assignor to Mitsubishi Denki Kabushiki Kaisha, Tokyo, Japan

Filed Sep. 15, 1989, Ser. No. 407,991
Claims priority, application Japan, Sep. 22, 1988, 63-239417
Int. Cl.[5] B62D 5/04
U.S. Cl. 180—79.1 2 Claims



1. A motorized power steering apparatus for a vehicle comprising:

a torque sensor having a right turn potentiometer for generating an output voltage corresponding to a steering torque exerted by a driver of the vehicle only when the steering torque is in a direction to turn the vehicle to the right and a left turn potentiometer for generating an output voltage corresponding to a steering torque exerted by the driver only when the steering torque is in a direction to turn the vehicle to the left;

a motor for generating an auxiliary steering force;

motor control means for controlling the motor torque in accordance with the output voltage of one of the potentiometers; and

means for preventing the motor from operating when both of the potentiometers generate an output voltage of above a prescribed level at the same time.

4,986,381

UNITIZED ELECTRIC POWER STEERING APPARATUS

Mitsuharu Morishita, and Takeshi Yasukawa, both of Himeji, Japan, assignors to Mitsubishi Denki Kabushiki Kaisha, Tokyo, Japan

Filed Jun. 20, 1989, Ser. No. 368,633
Claims priority, application Japan, Jul. 14, 1988, 63-177943
Int. Cl.[5] B62D 5/04
U.S. Cl. 180—79.1 3 Claims

1. A unitized electric power steering apparatus for an automotive vehicle, comprising:

a closed main housing (108);

an electric motor (103) mounted on an outside of said main housing;

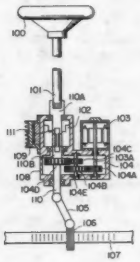
a rotatable input member (110A) rotatably supported by said main housing and connected to a steering shaft (101) of the

vehicle so that a steering torque is applied to said rotating input member when the steering shaft is rotated;

a torque sensor (**102**) disposed inside said main housing for sensing the magnitude and direction of the steering torque applied to the rotating input member.

a rotating output member (**110B**) supported by said main housing and connected to a steering gear (**106**) of the vehicle to transmit a steering torque to the steering gear;

a speed reducer (**104**) disposed inside said main housing and connected between said electric motor and said rotating



output member to transmit the rotation of said electric motor to said rotating output member at a reduced speed; and

a motor controller (**109**) mounted to the outside of said main housing, physically separated from the electric motor and disposed remote therefrom, for controlling the operation of said motor in accordance with the torque sensed by said torque sensor, wherein the motor controller is disposed within a separate housing therefor, and wherein said separate housing is provided with cooling fins.

4,986,382

POWER ASSISTANCE FOR VEHICLE STEERING MECHANISMS

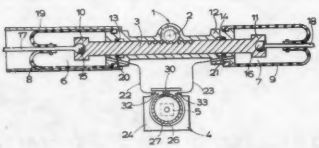
Anthony W. Harrison, Birmingham, England, assignor to Lucas Industries Public Ltd. Co., Birmingham, England

Filed May 16, 1989, Ser. No. 352,390

Claims priority, application United Kingdom, May 20, 1988, 8811966

Int. Cl.[5] **B62D** *5/16*

U.S. Cl. 180—148 **12 Claims**



1. A fluid-pressure operated power assistance system for a vehicle steering mechanism having a rotary steering member for operation by a steering wheel and a reciprocating steering control member, said control member having opposite ends, and a sealing boot provided on each said end, said system including a source of fluid pressure, and a pair of fluid pressure chambers to which fluid from said source is supplied, the pressure in said chambers acting in opposite directions on said control member, wherein each said chamber is defined by a respective one of said sealing boots and each said end of said control member is contained wholly within said respective chamber defined by said boot, whereby the pressure in each said chamber acts directly on said respective end of said control member.

4,986,383

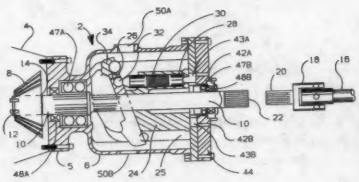
VEHICLE BRAKING SYSTEM FOR CONVERTING AND STORING THE MOMENTUM OF A VEHICLE AND USING THE STORED ENERGY TO RE-ACCELERATE THE VEHICLE

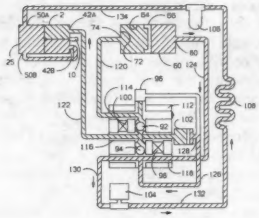
Kenneth W. Evans, 561 Billow Dr., San Diego, Calif. 92114

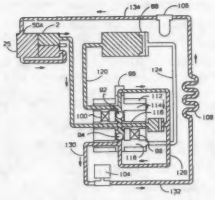
Filed Dec. 29, 1986, Ser. No. 946,959

Int. Cl.[5] **B60K** *6/00*; **F15B** *1/02*

U.S. Cl. 180—165 **12 Claims**







1. In a vehicle self-propelled by an engine whose propelling force is transmitted through an axially rotating drive shaft, said vehicle also having an acceleration control means and a braking control means, a system for converting and storing at least a portion of the kinetic energy lost to the vehicle when it is braking and applying the stored energy to re-accelerate the vehicle, the system comprising:

(a) a variable displacement hydraulic pump/motor having a rotor concentrically affixed to a segment of the drive shaft, the pump/motor having selectable pump and motor modes,

(b) a fluid reservoir means containing fluid under low pressure from which the pump/motor can draw fluid when it is in pump mode and into which it can discharge fluid when it is in motor mode,

(c) an hydraulic pressure accumulator in fluid communication with the pump/motor through a charge and discharge path, the accumulator being charged by accumu-

lating pressure when the pump motor is in its pump mode, and the accumulator being discharged by releasing its accumulated pressure into the pump/motor when the pump/motor is in its motor mode,

(d) means in fluid communication with the charge path between the pump/motor and the accumulator for opening a fluid path when the pump/motor is in pump mode and the accumulated pressure goes beyond a threshold of said means in fluid communication with the charge path between the pump/motor and the accumulator, the opened fluid path being operable to bleed fluid from the accumulator when an accumulator charge is in excess of said threshold and return the fluid bled from the accumulator to the pump/motor for recirculating through the pump/motor to keep it loaded,

(e) a first means in fluid communication with the pump/motor for unloading the pump/motor when the pump/motor is in motor mode and the accumulator is fully discharged, the first pump/motor unloading means opening a fluid path enabling the pump/motor to be substantially unloaded,

(f) a second means in fluid communication with the pump/motor for unloading the pump/motor when the vehicle is being operated in reverse, the second pump/motor unloading means opening a fluid path enabling the pump/motor to be substantially unloaded,

(g) means disposed in the charge and discharge path between the pump/motor and the accumulator for holding a charge in the accumulator whenever the vehicle is being operated in reverse, or whenever neither the acceleration control means nor the braking control means are actuated,

(h) means for putting the pump/motor in its pump mode whenever the braking control means is actuated and the vehicle is moving forward, and

(i) means for putting the pump/motor in its motor mode whenever the acceleration control means is actuated and the vehicle is moving forward.

4,986,384

REMOTE CONTROL SYSTEM OF MOBILE OBJECTS

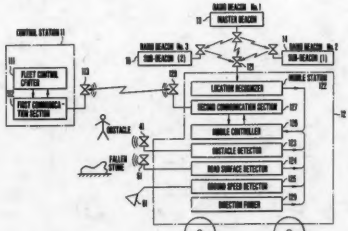
Hironobu Okamoto; Tetsujirou Izumi; Hiroo Kishi, and Naoki Okamoto, all of Ichikawa, Japan, assignors to Robotech Laboratory Co., Ltd., Chiba, Japan

Filed Oct. 12, 1989, Ser. No. 420,267

Claims priority, application Japan, Oct. 19, 1988, 63-263431

Int. Cl.[5] G05D *1/02*

U.S. Cl. 180—167 **3 Claims**



1. A remote control system for mobile objects, comprising:

a plurality of radio beacons;

a control station; and

one or more mobile stations;

each of said mobile stations being mounted on a mobile object;

each said mobile station comprising;

a location recognizer for recognizing its own position on a route map set in advance by a signal from said radio beacons,

an obstacle detector for detecting the existence of any obstacles on the forward route of said mobile object,

a ground speed detector for detecting the ground speed of said mobile object,

a mobile controller for receiving the output signal of said location recognizer, the output signal of said obstacle detector and the output signal of said ground speed detector, and

a communication section for communicating with said control station;

said control station comprising;

another communication section for communicating with each of said mobile stations, and

a fleet control center for generating a change command for a route on the basis of said route map and the information received from said mobile controller;

said mobile controller controlling the movement of its own mobile object on the basis of one or more of said received output signals and the command from said fleet control center; and

said fleet control center supervising the operation of said one or more mobile objects on the basis of one or more of said output signals.

4,986,385

VEHICLE SPEED AUTOMATIC CONTROL DEVICE

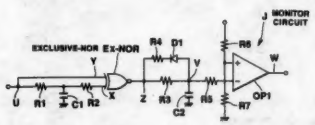
Yozo Masaki, Yokohama, Japan, assignor to Jidosha Denki Kogyo Kabushiki Kaisha, Kanagawa, Japan

Filed Oct. 31, 1989, Ser. No. 430,692

Claims priority, application Japan, Oct. 31, 1988, 63-142318[U]

Int. Cl.[5] B60K *31/04*

U.S. Cl. 180—179 **1 Claim**



1. An automatic vehicle speed control device comprising:

a speed sensor generating a speed signal in response to a running speed of a vehicle;

an actuator driving a throttle valve of the vehicle;

memory means for storing the speed signal generated by the speed sensor in response to operation of a command switch provided in the vehicle;

a driving circuit driving the actuator;

a microcomputer having means for comparing an actual speed signal detected by the speed sensor and a stored speed signal stored in the memory means and for generating a differential signal of the speed signals, means for controlling the driving circuit in response to the differential signal, and means for generating a watchdog pulse signal with a constant period in normal operation of the microcomputer, and

a monitor circuit monitoring the condition of the microcomputer in which the monitor circuit prevents the operation of the actuator in the event of the abnormal condition of the microcomputer;

wherein said monitor circuit including:

(a) a signal input terminal to which the watchdog pulse signal is supplied;

(b) a resistor and capacitor circuit having a first resistor connected at the end to said signal input terminal and a second resistor and a first capacitor connected to the other end of the first resistor;

(c) an exclusive NOR gate having a first input terminal

thereof connected to said signal input terminal and a second input terminal thereof connected to the second resistor of said resistor and capacitor circuit;

(d) a charging and discharging circuit having a third resistor connected at one end to the output terminal of said exclusive gate, a second capacitor connected to the other end of the third resistor, and a series circuit with a fourth resistor and a diode connected to the third resistor in parallel; and

(e) an operational amplifier connected to said charging and discharging circuit to compare the output signal of said charging and discharging circuit with a predetermined reference voltage supplied thereto, said operational amplifier generating an output signal which prevents the operation of the actuator when the output signal of the charging and discharging circuit exceeds the predetermined threshold voltage.

4,986,386

APPARATUS FOR ADJUSTING THE TREAD OF STEERABLE WHEELS OF A VEHICLE

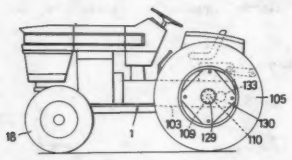
Masatoshi Iwamoto, and Toshinobu Owada, both of Osaka, Japan, assignors to Kubota Ltd., Osaka, Japan

Filed Sep. 1, 1989, Ser. No. 401,847

Claims priority, application Japan, Oct. 18, 1988, 63-263709; Apr. 7, 1989, 1-88595; Apr. 7, 1989, 1-88596

Int. Cl.[5] B62D *7/20*

U.S. Cl. 180—209 **12 Claims**



1. An apparatus for adjusting the tread of steerable wheels of a vehicle, comprising:

(a) an axle case having a horizontal axis extending transversely of said vehicle and supported by a chassis of said vehicle;

(b) a pair of movable cases which are respectively inserted into opposite ends of said axle case in such a manner as to be unrotatable about an axis thereof and axially movable;

(c) a pair of wheel cases arranged on the left-and right-hand sides of said vehicle and each supported by an outer end of said movable case in such a manner as to be rotatable about a diagonally inclined vertical axis;

(d) a pair of steerable wheels each supported rotatably by said wheel case and having alignment producing running resistance in the direction of returning to straight forward running at the time when said vehicle is steered leftward or rightward;

(e) a telescopically movable tie rod connecting said pair of wheel cases to each other;

(f) a steering mechanism for moving said tie rod leftward or rightward;

(g) a rod lock means for controlling the telescopic movement of said tie rod by remote control; and

(h) case lock means for controlling the axial movement of each of said movable cases wherein said case lock means comprises a pressure contacting member for bringing said movable case into pressure contact with said axle case, and a hydraulic cylinder for causing said pressure contacting member to be inserted into and withdrawn from a space between said movable case and said axle case.

4,986,387

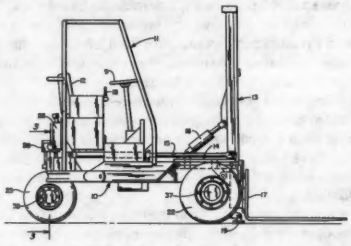
FORK-LIFT TRUCK HAVING THREE DRIVE WHEELS WITH THIRD WHEEL STEERABLE

Thomas K. Thompson, Granville, and Jack R. Mauck, Grove City, both of Ohio, assignors to Teledyne Princeton, Inc., Rexdale, Canada

Filed Aug. 7, 1989, Ser. No. 389,976

Int. Cl.[5] B62D *61/06, 5/06*

U.S. Cl. 180—212 **12 Claims**



1. A fork-lift truck comprising a main frame supported by two front wheels of the same diameter at opposite sides of the frame, a rear wheel of much smaller diameter supported by a dolly assembly at the rear of the frame, said dolly assembly being pivoted to the frame for swinging about a vertical axis for steering, means for swinging the assembly about its pivot to steer the truck with said rear wheel, each of the wheels having a hub with a hydraulic motor and an axially aligned torque hub, the torque hub and motor combination of the rear wheel being selected to apply a differential torque as compared to that applied by the torque hubs and motor combinations of the front wheels so that the front wheels and rear wheel will have the same tractive force over a surface on which the truck operates.

4,986,388

DRIVING FORCE DISTRIBUTION CONTROL SYSTEM FOR 4WD VEHICLE

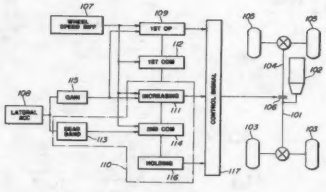
Toshiro Matsuda, Sagamihara, Japan, assignor to Nissan Motor Co., Ltd., Yokohama, Japan

Filed Mar. 20, 1990, Ser. No. 496,403

Claims priority, application Japan, Apr. 10, 1989, 1-89968

Int. Cl.[5] B60K *23/08*; G06F *13/10*; G06G *7/63*

U.S. Cl. 180—248 **18 Claims**



1. A driving force distribution control system for a vehicle, comprising:

a torque distributing means comprising a primary drive means for transmitting a driving force from an engine of the vehicle to primary drive wheels of the vehicle, and a secondary drive means for transmitting a driving force from the engine to secondary drive wheels of the vehicle through a torque distributing clutch capable of varying the driving force transmitted to the secondary drive wheels in accordance with a control signal,

said secondary drive means transmitting zero driving force to said secondary wheels when said control signal is zero increasing said drive force to said secondary wheels as said control signal increases.

a means for determining a wheel speed difference which is a difference between a primary wheel speed of the primary drive wheels and a secondary wheel speed of the secondary drive wheels,

a means for determining a lateral acceleration of the vehicle, and

a driving force distribution controlling means for producing said control signal, said controlling means comprising a first operational means for increasing said control signal in accordance with said wheel speed difference, and a second operational means for holding said control signal equal to zero when said lateral acceleration is higher than a predetermined value, and said wheel speed difference is within a predetermined dead band range in which said primary wheel speed is lower than said secondary wheel speed and an absolute value of said wheel speed difference is smaller than a predetermined level.

4,986,389

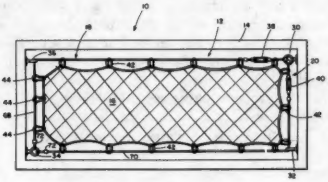
SLIDABLE SAFETY NET ASSEMBLY

Christopher J. Halligan, Sr., Wellesley, and Christopher J. Halligan, Jr., Gloucester, both of Mass., assignors to Westerbeke Fishing Gear Co., Inc., Boston, Mass.

Filed Jun. 13, 1990, Ser. No. 538,038

Int. Cl.[5] E04G *21/32*

U.S. Cl. 182—138 **20 Claims**



1. A safety net assembly configured to be positioned generally horizontally across an open, substantially rectangular pit area, said assembly comprising:

(a) guide cable means mounted about the top of the rectangular area at the corners thereof;

(b) a substantially rectangular safety net that is sized and shaped to be positioned generally horizontally across the open area to prevent access thereto,

(c) means for attaching said safety net to said guide cable means positioned along the sides and one end of the open area, said attaching means mounted to the sides and one end of said safety net, said attaching means constrained for limited movement relative to said safety net, said attaching means configured to be slidably attached to said guide cable means disposed along the sides of the open area; and

(d) quick release attaching means for attaching said safety net to said guide cable means positioned along the other end of the open area, said quick release attaching means constrained for limited movement relative to said safety net, said quick release attaching means configured to be clipped onto and easily released from engagement with said guide cable means;

(e) said safety net is slidable along said guide cable means when said quick release means is out of engagement with said guide cable means, access to the open area being provided by drawing said safety net toward the one end of the open area when said quick release means and said guide cable means are out of engagement;

(f) said safety net positioned generally horizontally across the open area and preventing access thereto when said quick release attaching means and said guide cable means at the other end of the open area are in engagement.

4,986,390

PORTABLE SLOW DESCENDER

Takeshi Kikuchi, 6-23, Shinmei-cho, Morioka-Shi, Iwate-Ken 020, Japan

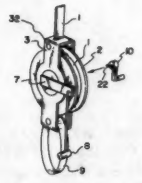
PCT No. PCT/JP87/00907, § 371 Date Jun. 8, 1989, § 102(e) Date Jun. 8, 1989, PCT Pub. No. WO88/04186, PCT Pub. Date Jun. 16, 1988

PCT Filed Nov. 19, 1987, Ser. No. 392,992

Claims priority, application Japan, Dec. 8, 1986, 61-189455[U]

Int. Cl.[5] A62B *1/08, 1/10;* F16D *59/00*

U.S. Cl. 182—234 **7 Claims**



1. A portable slow-descending device comprising:

a lifeline in the form of a tape made of a synthetic material;

a reel on which said life line is wound in superposing layers, said reel including a cylinder and opposing rims;

a frame for rotatably supporting a shaft of said reel at both ends of the shaft;

a suspension ring connected to said frame and adapted for connecting the device to a person;

a planetary gear acceleration unit formed within said cylinder; and

a centrifugal brake mechanism linked to said planetary gear acceleration unit within said cylinder and separated therefrom by a wall member, wherein said device descends with the person connected thereto for enabling access to mechanical parts during descent.

4,986,391

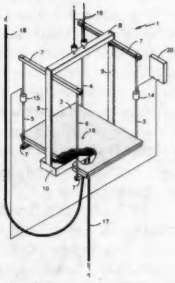
ELEVATOR LOAD WEIGHING

John K. Salmon, South Windsor, Conn., assignor to Otis Elevator Company, Farmington, Conn.

Filed Nov. 30, 1989, Ser. No. 444,334

Int. Cl.[5] B66B *5/14*

U.S. Cl. 187—1 R **4 Claims**



1. An elevator system, comprising:

a cab having a cab platform, horizontal beams, and suspen-

sion rods suspending said cab platform from said horizontal beams;

at least two sensor means, each associated with a corresponding one of said rods and the point of inflection of the related one of said rods, each responsive to the tension in the corresponding one of said rods for providing a tension signal proportional to the weight suspended from said corresponding rod; and

means responsive to said tension signals for providing a weight signal proportional to the weight of said cab.

4,986,392

SHOCK ABSORBER WITH VARIABLE DAMPING CHARACTERISTIC

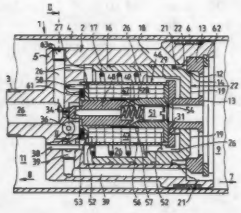
Werner Komossa, Börnsen, Fed. Rep. of Germany, assignor to Körber AG, Hamburg, Fed. Rep. of Germany

Filed May 12, 1989, Ser. No. 351,414

Claims priority, application Fed. Rep. of Germany, May 13, 1988, 3816351

Int. Cl.[5] F16F *9/50, 9/46*

U.S. Cl. 188—282 **15 Claims**



1. A shock absorber with a variable damping characteristic, particularly for use in motor vehicles, comprising at least one hollow cylinder defining an internal space for confinement of at least one damping fluid and having an internal surface surrounding said space; a piston rod extending from said cylinder; a piston provided on said piston rod and sealingly engaging said internal surface to divide said internal space into a first and a second cylinder chamber, said piston having first and second sections one of which is movable relative to the other of said sections and said sections defining a single passage of variable cross-sectional area for the entire flow of damping fluid between said chambers, said piston being axially movable in said cylinder back and forth to pressurize damping fluid in one of said chambers with attendant flow of fluid through said single passage into the other of said chambers and vice versa, said one section of said piston having a first surface which is acted upon by pressurized damping fluid with a first force acting in a first direction and a second surface which is acted upon by damping fluid with a second force acting in a second direction counter to said first direction; and electrically operated regulating means for varying said second force to thereby move said one section relative to said other section and to thus vary the area of said single passage as a function of the difference between said first and second forces.

4,986,393

ADJUSTABLE VIBRATION DAMPERS FOR MOTOR VEHICLES

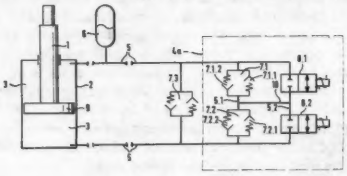
Alfred Preukschat, Königswinter, and Norbert Ackermann, Eitorf, both of Fed. Rep. of Germany, assignors to Boge AG, Eitorf, Fed. Rep. of Germany

Filed Feb. 8, 1989, Ser. No. 308,435

Claims priority, application Fed. Rep. of Germany, Feb. 9, 1988, 3803888

Int. Cl.[5] F16F *9/46, 5/00*

U.S. Cl. 188—299 **20 Claims**



1. An adjustable vibration damper for a motor vehicle comprising:

a cylinder containing a damping medium;

a piston disposed within said cylinder for movement of said damping medium;

a valve device connected to said cylinder for flow of said damping medium therethrough;

said valve device having at least a first damping element and a second damping element;

said first damping element including a first compression valve assembly and a first decompression valve assembly;

said second damping element including a second compression valve assembly and a second decompression valve assembly;

said first compression valve assembly having a first damping characteristic;

said first decompression valve assembly having a second damping characteristic;

said second compression valve assembly having a third damping characteristic;

said second decompression valve assembly having a fourth damping characteristic; said first compression valve assembly including said first damping characteristic which is at a higher level than said second damping characteristic of said first decompression valve assembly;

said second decompression valve assembly including said fourth damping characteristic which is at a higher level than said third damping characteristic of said second compression valve assembly; and

switching means for selectively switching to at least one of said first and said second damping elements;

said switching means including a four-way valve, said four-way valve for selectively switching to include both of said first and said second damping elements.

4,986,394

BRAKE ACTUATOR

Philip A. Taft, Cheswick Green, and Michael D. Knight, Birmingham, both of Great Britain, assignors to Lucas Industries, Birmingham, England

Continuation of Ser. No. 66,501, Jun. 26, 1987, abandoned. This application Jun. 8, 1990, Ser. No. 535,985

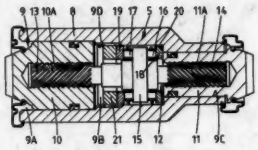
Claims priority, application United Kingdom, Jun. 26, 1986, 8615623

Int. Cl.[5] B60T *11/06*

U.S. Cl. 188—364 **7 Claims**

1. A brake actuator comprising a body adapted to be relatively fixed in use, said body having a pair of bores containing respective pistons, each piston partially defining with the body a hydraulic chamber for receiving hydraulic fluid under pres-

sure for moving said pistons outwardly of the body in order to separate friction elements engaged therewith in use into braking engagement with a rotatable braking surface; connecting means rotatably mounted in the body and having a pair of oppositely extending, oppositely handed, reversibly threaded portions which engage respective corresponding threaded portions of the pistons thereby to interconnect the pistons mechanically, the connecting means being axially fixed in the



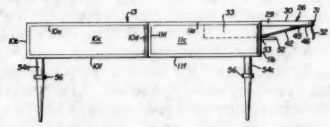
body at a location intermediate the threads, whereby the connecting means rotates freely without transmitting brake-applying force during equal outward brake-applying movement of the pistons under the effect of said fluid pressure, but when one piston is moved outwardly by said hydraulic pressure more than the other piston, this excess movement of said one piston tends to cause rotation of the connecting means via its threaded portion engaged with the connecting means in order to transmit to said other piston an opposite and proportional force.

4,986,395

COMBINED SUITCASE AND PORTABLE IRONING BOARD

Walter M. Lewis, 94 Pond St., New Haven, Conn. 06511

Filed Nov. 14, 1989, Ser. No. 435,756
Int. Cl.[5] A47B 85/00; A45G 9/00
U.S. Cl. 190—1 **33 Claims**



15. A combined suitcase and portable ironing board comprising, in combination:

a pair of suitcase sections each including a closed end surrounded by side walls and an open end, said sections including means for pivotable connection to one another along a side wall of each section so that said sections can be pivoted away from each other to an open position with said closed ends in the same plane forming an elongated, contiguous, substantially flat ironing board surface and said sections can be pivoted toward each other to a closed position with their open ends facing each other to form an enclosure;

a panel extending outwardly from the side wall of one suitcase section opposite the side wall which is pivotably connected to the other suitcase section and having a substantially flat surface lying in substantially the same plane as said closed ends and forming an extension of said ironing board surface;

means for supporting said panel in said outwardly extending position;

means for retracting said panel through an opening in said opposite side wall when said panel is not in use;

a plurality of legs attached to said suitcase sections and extending through said open ends for supporting said suitcase sections above the ground; and

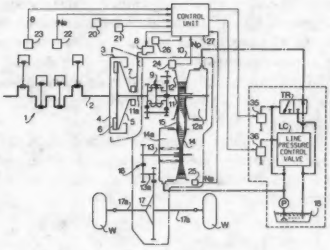
means for locking said pair of suitcase sections together when pivoted to said open position.

4,986,396

CONTROL SYSTEM FOR A CLUTCH OF A MOTOR VEHICLE

Yoshihiko Morimoto, Tokyo, Japan, assignor to Fuji Jukogyo Kabushiki Kaisha, Tokyo, Japan

Filed Jan. 18, 1989, Ser. No. 300,443
Claims priority, application Japan, Jan. 29, 1988, 63-18972; Jan. 29, 1988, 63-18973; Jan. 29, 1988, 63-18974
Int. Cl.[5] B60K 41/28
U.S. Cl. 192—0.052 **9 Claims**



1. In a control system of a friction clutch connected between an engine and driving wheels of a motor vehicle having a throttle valve mounted on said engine for controlling air-fuel mixture, a throttle valve opening degree sensor for detecting an opening degree of said throttle valve and for producing a corresponding throttle signal, a continuously variable transmission with a primary pulley operatively connected to said engine and a secondary pulley connected to said wheels for transmitting power from said engine to said wheels via said friction clutch, a primary pulley speed sensor for detecting speed of said primary pulley and for producing a primary speed signal, a secondary pulley speed sensor for detecting speed of said secondary pulley and for producing a secondary speed signal, a transmission ratio control system for changing transmission ratio of said continuously variable transmission to a desired transmission ratio and for producing a desired transmission ratio signal, an accelerator pedal connected to said throttle valve and mounted on said motor vehicle for controlling said power, an accelerator pedal switch connected to said accelerator pedal for producing an accelerator signal when said accelerator pedal is depressed, a select position sensor mounted on said transmission for producing a select position signal of a range which is selected, an actuator for operating a clutch plate of said friction clutch, and a clutch plate position sensor for detecting an actual position of said clutch plate and producing an actual position signal, the improvement in said control system which comprises:

a disengagement deciding section responsive to said secondary speed, said select position and said accelerator signals for producing a disengagement signal;

a partial engagement deciding section responsive to said select position, said accelerator and said disengagement signals for producing a partial engagement signal;

first means responsive to said disengagement signal for deciding a first desired position of said clutch plate and producing a first desired signal;

second means responsive to said partial engagement and said throttle signals for deciding a second desired position of said clutch plate and for producing a second desired signal;

zone deciding means responsive to said second desired and said actual position signals for deciding a first desired

pattern of engaging said clutch from disengagement to a predetermined partial engagement of said clutch at the second desired position of said clutch plate so as to shift said clutch plate to said second desired position of said clutch plate at said partial engagement of said clutch at a maximum speed and to maintain said partial engagement for a predetermined time;

another zone deciding means responsive to said second desired, said actual position and said desired transmission ratio signals for deciding a second desired pattern of engaging said clutch from said partial engagement to an entire engagement of said clutch and for producing a pattern signal so as to shift said clutch plate at a constant speed;

clutch engagement deciding means responsive to said secondary speed, said select position, said accelerator and said pattern signals for deciding a third desired position of said clutch plate and for producing a third desired signal;

a first comparator responsive to said first desired and said actual position signals for producing a first driving signal to actuate said actuator according to said first desired pattern; and

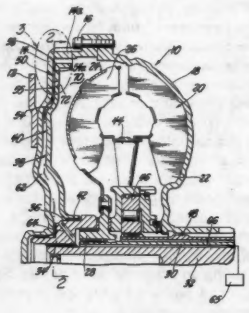
a second comparator responsive to said third desired and said actual position signals for producing a second driving signal to actuate said actuator according to said second desired pattern.

4,986,397

LOCK-UP PISTON PLATE FOR RECIRCULATING FLOW TORQUE CONVERTER

David T. Vierk, Naperville, Ill., assignor to Borg-Warner Automotive, Inc., Sterling Heights, Mich.

Filed Nov. 14, 1989, Ser. No. 436,530
Int. Cl.[5] F16H *45/02*; F16D *13/72*
U.S. Cl. 192—3.3 **9 Claims**



5. A piston plate for use in a hydrodynamic torque transmitting unit having a rotatable housing with a cover; said piston plate having an annular friction lining bonded thereto for producing a lock-up force on the cover of a rotatable housing of the hydrodynamic torque transmitting unit characterized by:

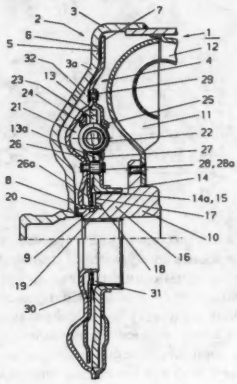
said friction lining having a continuous uninterrupted annular seal segment adapted to engage the cover plate for sealing against fluid flow from the outside diameter through the inside diameter of said annular friction lining in a radial direction; means forming a coolant passage through the friction lining radially outwardly of said annular seal segment for flow of coolant fluid through the friction lining for removing heat therefrom.

4,986,398

TORQUE CONVERTER CLUTCH

Steven P. Olsen, Wooster, Ohio, assignor to Luk Lamellen und Kupplungsbau GmbH, Buhl, Fed. Rep. of Germany

Filed Mar. 27, 1989, Ser. No. 328,948
Int. Cl.[5] F16H *45/02, 3/66*
U.S. Cl. 192—3.28 **20 Claims**



1. For use in a clutch of a torque converter having a turbine member, particularly in a motor vehicle, wherein an input member is connectable with an engine, a torque transmitting unit arranged to be associated with the input member to transmit torque by friction from the input member to the turbine member and comprising at least one vibration-suppressing damper having at least one hub disc, a second disc at one side of said hub disc, a substantially piston-shaped input element disposed at the other side of said hub disc and non-rotatably connected with said second disc, and resilient means operating between and in the circumferential direction of said discs to oppose rotation of the input element and of the hub disc relative to each other; and at least one energy storing device which is shielded by and is captive in said unit in the axial and radial directions of said unit prior to association of said unit with the input member, said device being arranged to bias said unit axially toward frictional engagement of said unit with said input member upon completed association of said unit with said input member.

4,986,399

SHIFTER BRAKE INTERLOCK SYSTEM

Donald J. Gokee, Bowling Green, Ohio, assignor to Babcock Industries, Inc., Fairfield, Conn.

Filed Apr. 17, 1989, Ser. No. 339,401
Int. Cl.[5] B60K *41/26*
U.S. Cl. 192—4 A **4 Claims**

1. In an automobile including a brake including a brake lever and a shifter for an automatic floor mounted transmission having a part position and other positions which includes a locking button to be depressed prior to removing the transmission from park position, said shifter including a linkage means connected at one end to the shifter and connected at to the other end to the transmission, a shifter brake interlock system comprising

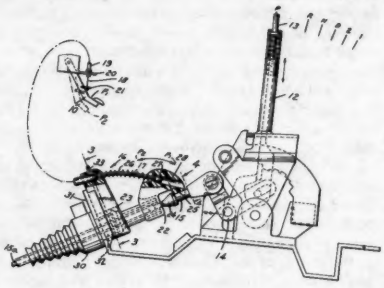
a latch,

a cable comprising a strand connected at one end to the brake lever and connected at the other end to said latch,

a stop on said linkage means,

said latch being movable into and out of engagement with said stop on said linkage means such that when the shifter is in park position, the latch is in engagement and when

the brake lever is engaged, the cable is tensioned moving the latch out of engagement with said stop permitting the shifter to be moved to shift the transmission through said linkage means,



said linkage means comprising a rod connected at one end to said shifter, another cable strand connected at one end to said rod and connected at the other end to the transmission, said stop being on said rod,

said latch being pivoted and engages said stop on said rod.

4,986,400

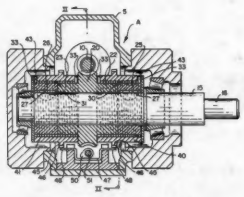
BI-DIRECTIONAL SPRING CLUTCH FOR REDUCING WORM GEAR DRIVE

Werner H. Heller, West Valley, N.Y., assignor to Peerless-Winsmith, Inc., Springville, N.Y.

Filed Apr. 20, 1989, Ser. No. 340,932

Int. Cl.[5] F16D *13/02, 13/08*

U.S. Cl. 192—26 **10 Claims**



1. A bi-directional spring clutch apparatus, comprising:

an output shaft rotatably mounted in a housing and adapted at one end for coupling to an external device to which said output shaft may impart rotational force;

a secondary drive member rotatably mounted coaxially about said output shaft intermediate the ends thereof and having a pair of coaxial extensions, one on each side, which rotate coaxially about said output shaft and which are rotatably fixed relative to said secondary drive member;

a primary drive member rotatably mounted in said housing so that it is rotationally coupled to said secondary drive member and adapted at one end for coupling to an external power device for imparting rotational force to said primary drive member;

a pair of torque transfer bushings mounted coaxially about said output shaft and rotatably fixed thereto, one torque transfer bushing being located adjacent one of said coaxial extensions and the other torque transfer bushing being located adjacent to the other coaxial extension and dimensioned to have the same outside diameter as said coaxial extensions;

a pair of wound springs, each of the same hand of winding, one of which is stretched over one torque transfer bushing and one coaxial extension located adjacent thereto, the other stretched over the other torque transfer bushing and other coaxial extension located adjacent thereto, and each of which is bent radially outward at both ends thereof to form tangs;

a pair of cylindrical control sleeves, one of which is rotatably mounted coaxially about one of said wound springs, the other is rotatably mounted coaxially about the other wound spring, each control sleeve including a pair of notches through which said tangs of the corresponding wound springs projects; and

stop means for controlling the rotation of said control sleeves.

4,986,401

DEVICE FOR CONTROLLING AN AUTOMATIC MOTOR-VEHICLE CLUTCH

Rainer Petzold, Friedrichshafen, and Norbert Wiencek, Hagnau, both of Fed. Rep. of Germany, assignors to Zahnradfabrik Friedrichshaften AG, Friedrichshafen, Fed. Rep. of Germany

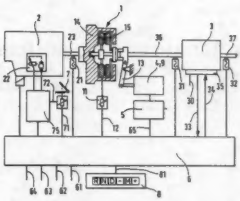
PCT No. PCT/EP88/00219, § 371 Date Sep. 21, 1989, § 102(e) Date Sep. 21, 1989, PCT Pub. No. WO88/07457, PCT Pub. Date Oct. 6, 1988

PCT Filed Mar. 18, 1988, Ser. No. 411,482

Claims priority, application Fed. Rep. of Germany, Mar. 26, 1987, 3710015

Int. Cl.[5] F16D *43/22*

U.S. Cl. 192—0.032 **10 Claims**



1. A device for controlling an automatic motor vehicle clutch having one side connected to an engine shaft driven by an engine and another side connected to an input shaft to a transmission, said shafts forming with said clutch a drive train transmitting an engine torque, said device comprising:

an electronic control unit storing a relationship between clutch position and torque transmitted through said train;

means for detecting an engine torque and rotational of said engine shaft; and

means responsive to at least one of a frequency and amplitude of a rotational speed of said engine shaft and a rotational input speed of said input shaft for effecting operation of a clutch control device connected to said control unit for opening said clutch in accordance with said relationship and to attenuate vibrations in said train.

4,986,402

CAGE FOR OVERRUNNING CLUTCH

Ernst Neuwirth, Herzogenaurach; Jürgen Rabe, Aurachtal, and Joachim Ritter, Herzogenaurach, all of Fed. Rep. of Germany, assignors to INA Walzlager Schaeffler KG, Fed. Rep. of Germany

Filed Jun. 2, 1987, Ser. No. 57,342

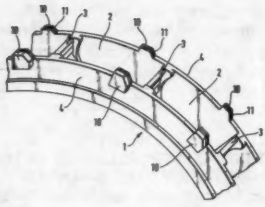
Claims priority, application Fed. Rep. of Germany, Jun. 20, 1986, 3620804

Int. Cl.[5] F16D *15/00, 41/07*

U.S. Cl. 192—45 **11 Claims**

1. A cage for an overrunning clutch with a metallic outer

race, accommodating concentrically a metallic inner element and having arranged between the outer race and the inner element camming elements retained under the action of springs in camming contact with the surfaces of the outer race, on the one hand, and of the inner element, on the other hand, the said cage being made of injection moldable and castable polymeric material and having pockets for the camming elements defined by crossbars and at least one end ring connected therewith and



whereby the cage is provided at least in the area of the end ring with an annular metallic shield connected to the cage in a forming-fitting manner especially through injection-molding, characterized in that the temperature expansion coefficient of the metallic shield corresponds essentially to that of the outer race (5,40) and the inner element (9,41), whereby the shield is formed from a disc-shaped sheet metal element (13,26,34,47), whose radial extension corresponds essentially to the radial extension of the end ring (4,23,33,45).

4,986,403

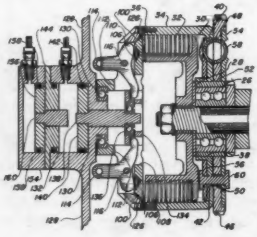
MULTI-STAGE MOTORCYCLE SLIDER CLUTCH

Kenneth L. Tipton, 1031 Fairlawn Dr., Rockledge, Fla. 32955

Filed Mar. 5, 1990, Ser. No. 488,212

Int. Cl.[5] F16D *13/42, 25/14, 43/12*

U.S. Cl. 192—70.11 **12 Claims**



1. An improved multi-stage motorcycle adjustable slider clutch utilizing original equipment manufacturers transmission output shaft, front bearing, transmission gear cluster main bearing assembly, thrust washer, center hub and a plurality of nested clutch friction discs and plates, also an aftermarket slider basket and a spring loaded housing gear assembly having the main bearing assembly joined into the housing gear forming a rotational bearing receptacle the improvement comprising;

(a) a pressure plate contiguous with the friction discs, urging the discs together during torque transmitting actuation;

(b) a basket enclosing flange having a plurality of rotatable counterbalanced fingers extending therethrough, the flange further attached to the basket such that the pressure plate is enclosed inside and the fingers are in intimate contact with the pressure plate urgingly forcing the pressure plate into contact with the friction discs and plates to compress together unitedly joining the slider basket member with the center hub making union between the housing gear assembly and transmission gear cluster at the same approximate rotational speed as the housing gear assembly, less slippage;

(c) a clutch housing cover having rotatable attaching means on a first side and a second side defining a hollow cylinder, therein with the attaching means interfacing between the enclosing flange and the housing cover allowing the enclosed basket member to be supported;

(d) first stage restraining means within the basket enclosing flange and housing cover suppressing the force created by the camming action of the counterbalanced fingers allowing the motorcycle engine to rotate in a neutral condition;

(e) first stage pneumatic actuating means contiguous with the restraining means supplying the reactionary force to overcome the thrust of the fingers, also providing an immediate release of the restraint allowing the clutch friction discs and plates to be instantly compressed together by the action of a specific number of fingers balancing the torque of the motorcycle engine with the coefficient of friction of the motorcycle engine with the coefficient of friction of the motorcycle wheels relative to the surface upon which the motorcycle is resting;

(f) second stage restraining means integral with the basket enclosing flange suppressing the remaining force created by the balance of the fingers defining positive control thereof;

(g) second stage pneumatic actuating means contiguous with the restraining means supplying the reactionary force to overcome the thrust of the balance of the fingers in a gradual manner allowing a predetermined release of the constraints such that the motorcycle engine torque does not further overcome the coefficient of friction of the motorcycle wheels; and,

(h) control means in communication with said first and second stage pneumatic actuating means providing an instantaneous partial engagement of the clutch in the first stage, and a timed sequential second stage modulated engagement therewith.

4,986,404

HYDRAULIC CLUTCH RELEASING MEANS

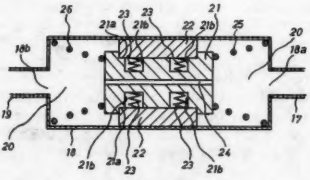
Koji Kajitani, and Minoru Abe, both of Neyagawa, Japan, assignors to Kabushiki Kaisha Daikin Seisakusho, Osaka, Japan

Filed Nov. 27, 1989, Ser. No. 441,578

Claims priority, application Japan, Dec. 15, 1988, 63-162964[U]

Int. Cl.[5] F15B *1/00;* **F16L** *55/00*

U.S. Cl. 192—109 F **8 Claims**



1. A hydraulic clutch releasing means equipped with a master cylinder device driven by operating a clutch pedal and a slave cylinder device driven by hydraulic pressure supplied from the master cylinder device for engaging or disengaging a clutch, characterized by that a cylindrical cylinder chamber formed by a casing and having inlet and outlet ports for pressurized liquid at opposite axial ends is installed in a liquid passage communicating a liquid chamber of said master cylinder device with a liquid chamber of said slave cylinder device; a cylindrical movable body member having a circumferential friction member divided into plural pieces contacting with a

peripheral wall of the cylinder chamber, plural first urging members fitted to said movable body member for pressing said friction members onto the peripheral wall of said cylinder chamber, and a second urging member in said cylinder chamber for urging said movable body member in an axial direction in said cylinder chamber for locating said moving body member at a prescribed axial position in said cylinder chamber; and orifice means in an axial direction on said moving body member.

4,986,405

INCLINED RAMP

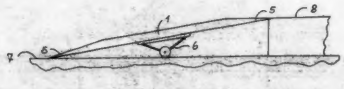
Kurt Alten, Ringstr. 14, D-3015 Wennigsen, Fed. Rep. of Germany

Filed Jan. 31, 1990, Ser. No. 473,229

Claims priority, application Fed. Rep. of Germany, Feb. 3, 1989, 3903177

Int. Cl.[5] B65G *11/00*

U.S. Cl. 193—38 **8 Claims**



1. In an inclined ramp that can be moved from place to place, especially a mobile ramp, and that serves for the loading and unloading of platforms or the like that are disposed at a level higher than the roadway, said ramp having two longitudinal members that are disposed at both sides of the ramp, with said longitudinal members being connected to one another via transverse members that are distributed over the length of said ramp and have an essentially U-shaped cross-sectional configuration, with said transverse members forming at least the greatest portion of a travel surface for said ramp, the improvement wherein:

each of said transverse members has a cross part that extends essentially perpendicular to said travel surface and connects two flanges, an upper one of which forms said travel surface and is provided with means to prevent slipping; and

a respective plate is disposed between each two adjacent cross parts of successive transverse members, with said two adjacent cross parts and said plate that is disposed therebetween being interconnected via bolt means, and with said plate projecting upwardly beyond said upper flange into the vicinity of said means thereof to prevent slipping.

4,986,406

ANTI-THEFT PARKING METER ANCHORING DEVICE

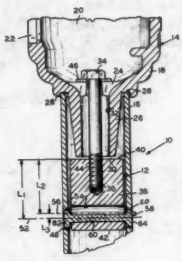
B. Drew Winsor, 165 Selborne Way, Morage, Calif. 94556

Filed Oct. 5, 1989, Ser. No. 417,274

Int. Cl.[5] G07F *9/00*

U.S. Cl. 194—350 **4 Claims**

1. An anti-theft device for anchoring a parking meter head to the top of a hollow support post which is formed with a pair of diametrically opposed transverse openings, the device comprising the combination of a capture cylinder sized to slidably fit within the post, the cylinder having a diametrical lateral bore, a locking pin comprising a shank which supports at its opposite ends a pair of heads, said heads having diameters sized to slidably fit through the transverse openings and through the lateral bore, said shank having a diameter less than the head diameters, and clamping means for holding the capture cylinder below the head in a first position in which the lateral bore is aligned with the transverse openings for insertion therethrough of the locking pin, said clamping means moving the cylinder upwardly in clamped relationship toward the meter head to a secure position where the lower portion of the bore is drawn up against the shank and lies between lower portions



of the heads to prevent sideways withdrawal of the locking pin.

4,986,407

APPARATUS FOR CONTROLLING THE PATH OF TRANSPORTATION OF ARTICLES

Bernhard Heuft, Im Sonnenwinkel 14, D-5475 Burgbrohl, Fed. Rep. of Germany

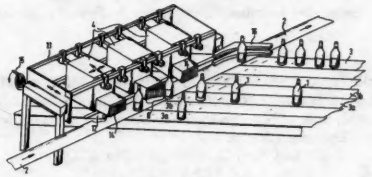
PCT No. PCT/EP88/00283, § 371 Date Dec. 7, 1988, § 102(e) Date Dec. 7, 1988, PCT Pub. No. WO88/07968, PCT Pub. Date Oct. 20, 1988

PCT Filed Apr. 7, 1988, Ser. No. 294,628

Claims priority, application Fed. Rep. of Germany, Apr. 7, 1987, 3711605

Int. Cl.[5] B65G *47/00*

U.S. Cl. 198—367 **5 Claims**



1. An apparatus for controlling the path of transportation of articles comprising:

a first conveyor belt which delivers the articles,

a plurality of second conveyor belts arranged in parallel side-by-side relationship which continue the conveyance of the articles,

a plurality of deflecting means for deflecting the articles from said first conveyor belt to a selected one of said second conveyor belts, and

a means for controlling the deflecting means;

wherein said first conveyor belt extends obliquely across and rests, across the entire width thereof, on the second conveyor belts and is relatively thin so that the articles can slide from said first conveyor belt onto one of said second conveyor belts without the risk of toppling over,

wherein said deflecting means are arranged on the side of said first conveyor belt facing away from the direction of conveyance of the second conveyor belts, and

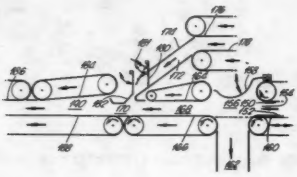
wherein said first conveyor belt is endless and is guided along a closed path completely above said second conveyor belts.

4,986,408

APPARATUS FOR HANDLING ROD-LIKE ARTICLES

David C. M. Carter, Blakelands; Ian Dunckley, High Wycombe, and Leonard G. Lait, Bletchley, all of England, assignors to Molins plc, London, England

Division of Ser. No. 721,414, Apr. 9, 1985, Pat. No. 4,795,020.
This application Sep. 26, 1988, Ser. No. 249,009
Claims priority, application United Kingdom, Apr. 9, 1984, 8409097
Int. Cl.[5] B65G *37/00*
U.S. Cl. 198—368 11 Claims



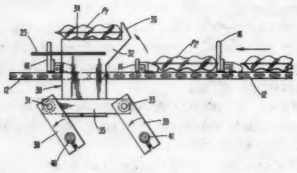
1. Apparatus for handling rod-like articles, comprising a generally horizontal first path for rod-like articles in a multi-layer stack formation, a downwardly extending second path for rod-like articles in multi-layer stack formation, a junction zone between said first and second paths, a pivoted closure member arranged adjacent the junction zone, means for biasing the closure member into a position to substantially block or inhibit passage of articles from said second path into said junction zone, and means for conveying articles along said second path towards said junction zone; the arrangement being such that when articles are conveyed along said second path said biasing means is overcome by pressure of articles so that said articles can move into said junction zone, and such that when articles are not conveyed along said second path said biasing means moves said closure member into said position thereby blocking or inhibiting passage of articles past said position to said junction zone, wherein the biasing means is arranged to exert a progressively decreasing closing force on said closure member as said member moves away from said position.

4,986,409

ASSEMBLY AND METHOD FOR STACKING ARTICLES

James Alexander, Cedar Knolls, and Robert Sinanian, Staten Island, both of N.J., assignors to Scandia Packaging Machinery Company, Clifton, N.J.

Filed Nov. 28, 1988, Ser. No. 276,951
Int. Cl.[5] B65G *57/32*
U.S. Cl. 198—418.4 12 Claims



3. An assembly for stacking a plurality of packages along conveying path, said assembly comprising:

(a) means for conveying at least two packages in tandem including a leading package and a trailing package along said conveying path having an incoming end and a discharging end with a lifting work station, a storage work station and a stacking work station disposed between the incoming and discharging ends;

(b) parallel linkage means for lifting the leading package at the lifting work station and depositing the leading package onto storage means for stationarily storing it at the storage work station;

(c) means for moving the trailing package through the lifting work station along said conveying path beneath the stored leading package into the stacking work station;

(d) means for removing the stored leading package from the storage means to stack the leading package on top of the trailing package located in the stacking work station; and

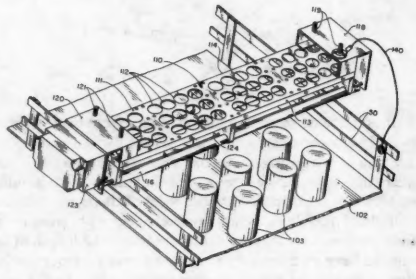
(e) means for discharging the stacked packages from the discharging end of the assembly.

4,986,410

MACHINE CONTROL APPARATUS USING WIRE CAPACITANCE SENSOR

Winston E. Shields, 8612 W. 127th St., Palos Park, Ill. 60464

Division of Ser. No. 162,755, Mar. 1, 1988, Pat. No. 4,871,058.
This application Jul. 24, 1989, Ser. No. 384,038
Int. Cl.[5] B65G *43/00*
U.S. Cl. 198—444 14 Claims



1. A sensing element for sensing the presence of cans on a conveyor of a machine wherein the conveyor has a metal frame and has a width sufficient to permit more than one can in side-by-side relation on said conveyor, comprising: an upper metal plate; means for connecting said upper metal plate to said frame of said conveyor above said conveyor while electrically connecting said metal plate to said frame; first and second insulating end blocks beneath said metal plate and on opposite ends thereof; a metal wire arranged beneath said metal plate and extending back and forth between said first and second end blocks in a repeating pattern across the width of said plate and above said cans on said conveyor; and detector circuit means electrically coupled to one end of said wire for detecting the input capacitance formed between said wire and said frame of said conveyor, said input capacitance being increased in proportion to the number of cans on said conveyor beneath said metal plate.

4,986,411

CONTINUOUS MOTION VERTICAL CONVEYOR

Bradley S. Splitstoser, Fond du Lac, and Richard Klaeser, Kiel, both of Wis., assignors to H. G. Weber & Co., Inc., Kiel, Wis.

Filed Sep. 19, 1989, Ser. No. 409,579
Int. Cl.[5] B65G *47/04*
U.S. Cl. 198—475.1 12 Claims

1. A continuous motion vertical conveyor comprising:

a first flexible endless member disposed to travel in a first generally rectangular path of travel;

a second flexible endless member disposed to travel in a second generally rectangular path of travel;

said second path of travel lying in a plane parallel to said first path of travel and vertically offset from said first path of travel;

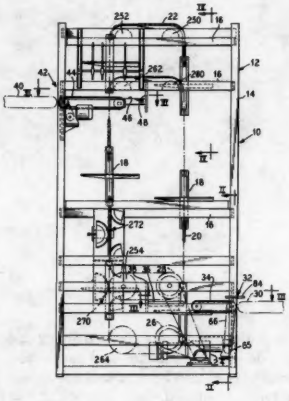
a plurality of horizontal platforms adapted to support articles to be conveyed;

said platforms each having a first upwardly extending arm

pivotally attached at a free end thereof o said first flexible endless member and a downwardly extending arm pivotally attached at a free end thereof to said second flexible endless member, said arms being formed on opposite sides of said platform;

drive means for driving said endless members in synchronization;

an infeed station for horizontally receiving materials to be conveyed;



an outfeed station for horizontally discharging materials from the conveyor at an elevation different from that of said infeed station;

means operatively associated with said infeed and outfeed stations for permitting said platforms to pass through said infeed and outfeed stations to pick up and discharge, respectively, materials without requiring said platform to change speed as it passes through said stations.

4,986,412

EXTENSIBLE CONVEYOR SYSTEM

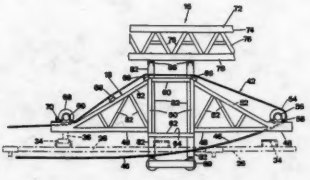
Raymond Brais, Montreal, Canada, assignor to Walsh & Brais Inc., Brossard, Canada

Division of Ser. No. 292,006, Dec. 30, 1988, Pat. No. 4,890,720. This application Dec. 29, 1989, Ser. No. 459,357

The portion of the term of this patent subsequent to Jan. 2, 2007, has been disclaimed.

Int. Cl.[5] B65G *15/26*

U.S. Cl. 198—592 **3 Claims**



1. A method of continuously extending a conveyor belt system, wherein the conveyor belt system includes an inby section and an outby section, a rigid frame having a return reach and a conveying reach spaced apart vertically on the rigid frame, and a conveyor belt supported about the rigid frame on the respective return reach and conveying reach, the method including independently advancing the conveyor belt while adding supplementary frame members to the inby section of the rigid frame while advancing the conveyor belt, increasing the vertical spacing between the return reach and conveying reach while inserting and conveying reach rollers onto the supplementary frame members in the space between the conveying reach and the return reach of the belt as it is being advanced near the inby end thereof.

4,986,413

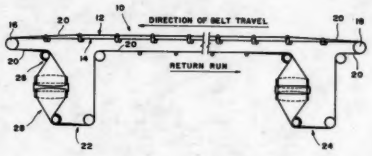
CONVEYOR BELT INVERSION DEVICE

Dennis Mraz, Saskatoon, Canada, assignor to DM Enterprises, Inc., Saskatoon, Canada

Filed Nov. 14, 1989, Ser. No. 436,202

Int. Cl.[5] B65G *15/60*

U.S. Cl. 198—839 **10 Claims**



1. An inversion apparatus for inverting a return run of a moving conveyor belt, comprising:

a first bend roller carrying the return run of the belt and having a horizontal rotation axis oriented transversely to an upper run of the belt;

a second bend roller having a horizontal rotation axis oriented parallel to the upper run of the belt, the first and second bend rollers twisting the return run of the belt 90° and bending the return run of the belt 90° away from the upper run of the belt;

a third bend roller having a horizontal rotation axis oriented parallel to the upper run of the belt;

a fourth bend roller having a horizontal rotation axis oriented transversely to the upper run of the belt, the third and fourth bend rollers twisting the return run of the belt and additional 90° to complete a 180° twisting belt, and bending the belt an additional 90° to parallel the upper run; and

a frame supporting the first, second, third and fourth bend rollers in their respective positions.

4,986,414

CONTAINER FOR A NUMBER OF PACKAGED CONTACT LENSES

Charles R. Ashley, Pattenburg, N.J.; Russell J. Crossman, Jacksonville, Fla.; John P. Hennessy, Jacksonville, Fla., and William J. Lahm, Jacksonville, Fla., assignors to Vistakon, Inc., Jacksonville, Fla.

Filed Jul. 13, 1988, Ser. No. 218,732

The portion of the term of this patent subsequent to Nov. 8, 2005, has been disclaimed.

Int. Cl.[5] A45C *11/04*

U.S. Cl. 206—5.1 **13 Claims**

1. A container for a plurality of individually packaged contact lenses comprising:

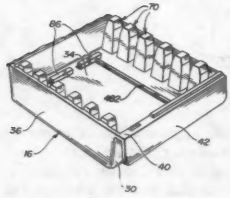
a bottom portion having a bottom, a first pair of generally opposing walls integral with and extending upwardly from said bottom and a second pair of generally opposing walls integral with and extending upwardly from said bottom and integrally attached to said first pair of generally opposed walls;

a plurality of projections extending from said bottom and spaced at predetermined intervals along said first pair of said opposing walls and integral with the respective one of said first pair of opposing walls along which the particular projections extend, each of said projections spaced from the adjacent projection a predetermined distance to pro-

vide a slot therebetween for holding an individual package;

each of said slots along one of said first pair of opposing walls aligned with a corresponding slot along the other of said first pair of opposing walls;

a top portion having a top, a third pair of generally opposing walls integral with and extending downwardly from said top and a fourth pair of generally opposing walls integral with and extending downwardly from said top and integral with said third pair of generally opposing walls; and



a hinge disposed along an edge of said top portion and disposed along a corresponding wall of said bottom portion and integral therewith for hinging said top portion and said bottom portion together to permit said top portion to rotate about said hinge from an open position to a closed position to form a closed container for individual packages; and,

at least one raised portion projection above said bottom portion bottom at least part of said raised portion being aligned with each of said slots defined by said projections disposed along said first pair of opposing walls of said bottom portion.

4,986,415

BOX FOR THE STORAGE, DISPLAY AND SELECTION OF DISKETTES OR OTHER MAGNETIC MEMBERS

Patrick P. Posso, Lausanne, Switzerland, assignor to Posso S.A., Paris, France

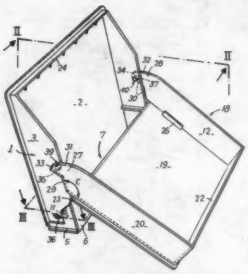
Filed Sep. 30, 1985, Ser. No. 781,526

Claims priority, application France, Oct. 1, 1984, 84 15063

Int. Cl.[5] B65D *5/52*

U.S. Cl. 206—45.23 **3 Claims**

1. A box for the storage, display and selection of diskettes or other magnetic members comprising a body, a lid and means for holding said lid in an open position, said body including a base, a pair of side walls, a back part and a back upper part which together define a receptacle for receiving diskettes or other members, said lid including a front upper part, a pair of side walls and a frontal part, said front upper part of said lid being joined to said back upper part of said body by means of a continuous integral hinge, said side walls of said lid and said body being in mutual overlapping relation, said means for holding said lid in an open position being adapted to keep said lid open by resting said lid on said body such that said lid is tilted back so as to form a first obtuse angle with respect to the plane perpendicular to said base and traversing said hinge such that, in the open position and when the opposite edges of said back part of said body and said front upper part of said lid rest on a support surface, the diskettes or other members within said receptacle are also tilted back, said means for holding said lid in an open position includes at least one pin projecting from a side of said lid and at least one hole provided in the like side of said body, said pin being adapted to cooperate with said



hole, said pin projecting from a rearwardly extending portion provided on said side of said lid, said rearwardly extending portion extending rearward beyond said hinge, said hole being provided on said side of said body in front of said hinge such that a fictitious line traversing said hinge and said pin forms a second obtuse angle with said front upper part of said lid, said second obtuse angle corresponding to said first obtuse angle when the acute angle formed by a fictitious line traversing said hinge and said hole with the base of said body is deducted.

4,986,416

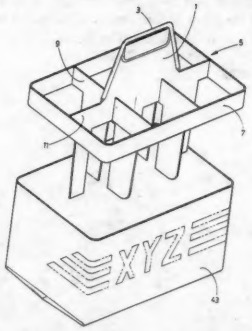
BAG BOTTLE CARRIER

Raymond C. Arthurs, 50 Trudelle St., Scarborough, Ontario, Canada M1J 1Z3

Filed May 5, 1988, Ser. No. 190,474

Int. Cl.[5] B65D *75/00*

U.S. Cl. 206—170 **20 Claims**



1. A carrier for carrying a plurality of articles comprising:

a substantially stiff rectangular frame having a cellular structure to divide the interior of the frame into a plurality of article receiving compartments,

a substantially rigid handle connected to the frame substantially along a center line of the frame, said handle being

substantially perpendicular to the plane formed by the frame, and

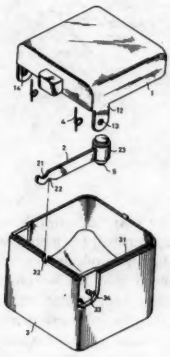
a bag closed at one end and open at the other, having its open end dimensioned to fit the dimensions of the frame, and secured thereto wherein the bag is a seamless plastic tube with the closed end of the bag being sealed and the bag folded and opened to a substantially rectangular shape.

4,986,417

STRUCTURE OF STATIONERY CASE

Nick Hsu, 293 Per Tun Road, Taichung, Taiwan

Filed Nov. 22, 1989, Ser. No. 440,246
Int. Cl.[5] B65B *83/00*
U.S. Cl. 206—214 **3 Claims**



1. A stationery case comprising

a pivotable cover having a pair of lugs connected to said cover and extending at right angles to a top of said cover, each of said lugs having a hole through the lug, said lugs defining between them a rotation facilitating space,

a container comprising a bottom and side walls extending upwardly therefrom for engagement with said cover, a side wall of said container in vertical alignment with said rotation facilitating space having a notch at an upper edge thereof, two side walls of said container in vertical alignment with said lugs, each having a pivot pin attached thereto for insertion into the holes of the lugs,

an elongated actuating lever having a magnet attached thereto at a front end thereof, said actuating lever further comprising an arch-shaped retaining portion at an upper rear end and a stop portion at a lower rear end,

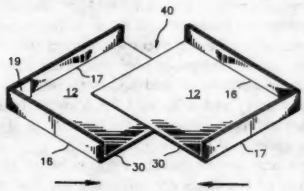
and wherein said cover is pivotably attached to said container by means of the pivot pins fitting into the holes in said lugs, said rear end of said actuating lever being secured between said cover and said container in a region of said notch, such that said actuating lever is pivoted when said cover is pivoted about said container, the magnet therefore being rotatable from a position at the container bottom when said cover is closed to a position above the container sidewalls when said cover is open, and vice versa, said magnet and actuating lever being adapted to present metallic objects normally disposed on the container bottom at an easily accessible position at the top of said container, upon opening of the cover.

4,986,418

BLANK PREFORM AND TRAY PALLET

Richard B. Gwathmey, York County, S.C., assignor to Pallet Systems, Inc., Rock Hill, S.C.

Filed Aug. 22, 1989, Ser. No. 397,041
Int. Cl.[5] B65D *5/32*
U.S. Cl. 206—386 **7 Claims**



1. A preform for a pallet tray comprising;

a first body of sheet material cut, scored, folded and erected into a substantially square flat tray having a main portion bounded along two contiguous sides by cut edges and two raised lip portions joined to the main portion along fold lines bounding two contiguous sides of said main portion, said lip portions having a height which is a minor fraction of the length of a side cut edge of said main portion and being joined at a contiguous corner by a lap portion joined to a contiguous one of said lip portions along a fold line and extending along the other of said lip portions, and means for securing together said lap portion and said other lip portion;

a second body of sheet material cut, scored, folded and erected into a substantially square flat tray having a main portion bounded along two contiguous sides by cut edges and two raised lip portions joined to the main portion along fold lines bounding two contiguous sides of said main portion, said lip portions having a height which is a minor fraction of the length of a side cut edge of said main portion and being joined at a contiguous corner by a lap portion joined to a contiguous one of said lip portions along a fold line and extending along the other of said lip portions, and means for securing together said lap portion and said other lip portion; and

means for securing together said first and second bodies of sheet material with said first and second body main portions overlying one another and said first and second body lip portions contiguous each to another, said means for securing together said first and second bodies joining said bodies at said lip portions so that said main portions are free of direct securement therebetween.

2. A pallet tray comprising:

first and second pallet preforms, each comprising

a first body of sheet material cut, scored, folded and erected into a substantially square flat tray having a main portion bounded along two contiguous sides by cut edges and two raised lip portions joined to the main portion along fold lines bounding two contiguous sides of said main portion, said lip portions having a height which is a minor fraction of the length of a side cut edge of said main portion and being joined at a contiguous corner by a lap portion joined to a contiguous one of said lip portions along a fold line and extending along the other of said lip portions, and means for securing together said lap portion and said other lip portion;

a second body of sheet material cut, scored, folded and erected into a substantially square flat tray having a main portion bounded along two contiguous sides by cut edges and two raised lip portions joined to the main portion along fold lines bounding two contiguous sides of said main portion, said lip portions having a height which is a minor fraction of the length of a side cut edge of said main portion and being joined at a contiguous corner by a lap portion joined to a contiguous one of

said lip portions along a fold line and extending along the other of said lip portions, and means for securing together said lap portion and said other lip portion; and

means for securing together said first and second bodies of sheet material with said first and second body main portions overlying one another nd said first and second body lip portions contiguous each to another, said means for securing together said first and second bodies joining said bodies at said lip portions so that said main portions are free of direct securement therebetween,

said first and second pallet preforms being positioned with said main portions of said bodies thereof in interleaved, stacked array and with said lip portions of said bodies thereof defining portions of the boundaries of a generally rectangular load receiving area,

said first and second pallet preforms being movable one relative to the other for adjusting the size of the load receiving area defined thereby.

3. A bulk package adapted for handling by mechanized materials handling equipment and comprising

a pallet tray comprising

first and second pallet preforms, each comprising

a first body of sheet material cut, scored, folded and erected into a substantially square flat tray having a main portion bounded along two contiguous sides by cut edges and two raised lip portions joined to the main portion along fold lines bounding two contiguous sides of said main portion, said lip portions having a height which is a minor fraction of the length of a side cut edge of said main portion and being joined at a contiguous corner by a lap portion joined to a contiguous one of said lip portions along a fold line and extending along the other of said lip portions, and means for securing together said lap portion and said other lip portion;

a second body of sheet material cut, scored, folded and erected into a substantially square flat tray having a main portion bounded along two contiguous sides by cut edges and two raised lip portions joined to the main portion along fold lines bounding two contiguous sides of said main portion, said lip portions having a height which is a minor fraction of the length of a side cut edge of said main portion and being joined at a contiguous corner by a lap portion joined to a contiguous one of said lip portions along a fold line and extending along the other of said lip portions, and means for securing together said lap portion and said other lip portion; and

means for securing together said first and second bodies of sheet material with said first and second body main portions overlying one another and said first and second body lip portions contiguous each to another, said means for securing together said first and second bodies joining said bodies at said lip portions so that said main portions are free of direct securement therebetween,

said first and second pallet preforms being positioned with said main portions of said bodies thereof in interleaved, stacked array and with said lip portions of said bodies thereof defining portions of the boundaries of a generally rectangular load receiving area,

said first and second pallet preforms being movable one relative to the other for adjusting the size of the load receiving area defined thereby,

a quantity of sheet material load elements stacked on said pallet tray load receiving area, and

wrap means encircling said load elements and said pallet tray for unifying said pallet tray and said load elements for handling.

4,986,419

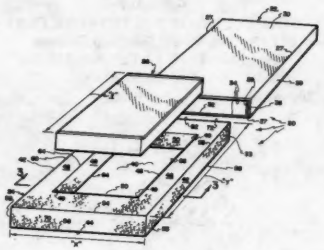
PACKAGING FOR POINT OF SALE DISPLAY, SHIPMENT AND STORAGE OF CASSETTE RECORDINGS AND METHODS

Michael F. Collett, Kaysville, and Peggy J. Rankin, Kearns, both of Utah, assignors to Bonneville International Corporation, Salt Lake City, Utah

Continuation of Ser. No. 100,511, Sep. 24, 1987, Pat. No. 4,838,420. This application Jan. 13, 1989, Ser. No. 297,219

Int. Cl.[5] B65D *85/672*

U.S. Cl. 206—387 **13 Claims**



1. An assembly for point of sale display, shipment, after purchase retrievable, vertically oriented storage and off-the-shelf after purchase handling of one to several cassette recordings, at any one point in time, the assembly comprising:

external substantially rectangular sleeve means of sheet material comprising exposed exterior surface means comprised of opposed side wall means and opposed front and rear wall means, a hollow interior within the wall means, means defining at all points in time a permanent non-closable opening at each end of the sleeve means, the permanent opening at each end being defined by end edges of the opposed side, front and rear wall means collectively disposed in a common plane, at least some of the exposed exterior surface means of the sleeve means comprising identifying indicia visually observable both when the assembly is displayed at a point of sale and after sale when vertically placed on one of the end edges in library-like storage;

cassette recording means comprising at least one and up to several cassettes inserted through one of the end openings and disposed at any one point in time within the sleeve means;

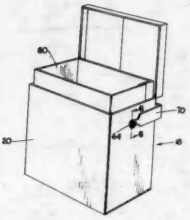
cushion insert means having a cross-section substantially similar to the cross-section of the hollow interior of the sleeve means, dimensioned to linearly slide into and out of the hollow interior of the sleeve means through either end opening by manual force but comprising means creating a snug assembled relation between the cushion insert means and the sleeve means prohibiting inadvertent separation through either opening, the cushion insert means further comprising means contiguously engaging at least one edge of each cassette comprising the cassette recording means accommodating intentional placement and removal of the cassette recording means and the cushion insert means so as to prevent inadvertent separation of the cassette recording means and cushion insert means from the assembly through either opening after the assembly is telescopically assembled.

4,986,420

PACKAGE WITH MULTI-PLY SIDE PANELS AND STRAP HANDLE

Charles L. Gunn, Lawrenceburg, Ind., and Robert J. Apke, Cincinnati, Ohio, assignors to The Proctor & Gamble Company, Cincinnati, Ohio

Filed Aug. 11, 1989, Ser. No. 392,329
Int. Cl.[5] B65D *25/16, 5/46*
U.S. Cl. 206—607 20 Claims



1. A top opening package for housing granular or similar materials, such package comprising:

(a) an outer body having a top wall, a bottom wall, and a side wall connecting the top wall to the bottom wall to form an enclosure, the side wall having two apertures therein, each aperture being located on the opposite side of the package from the other;

(b) a section of the side wall adjacent each of the apertures incuding a liner separating the granular contents of the package from the area immediately surrounding the aperture, the liner being unattached to the outer body in such area and adapted to prevent the flow of the granular contents out through the aperture; and

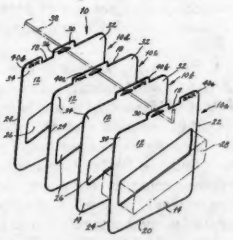
(c) a substantially flat strap handle having at least one barb member on each end, one end of the handle being inserted through one of the apertures into a space between the liner and the outer body and the other end of the handle being inserted through the other aperture into a space between the liner and the outer body so that the end of each handle is moveable in the space between the liner and the outer body, the barb member on each end being adapted to hook the material of the outer body surrounding the respective aperture without permitting the handle to completely pull out of the apertures during normal use.

4,986,421

BLISTER CARD SET

Larry Lipsitz, 1573 Heather Croft Dr., Chesterfield, Mo. 63017

Filed Jan. 2, 1990, Ser. No. 459,476
Int. Cl.[5] B65D *73/00*
U.S. Cl. 206—459 4 Claims



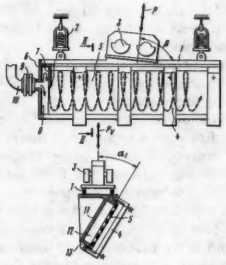
1. A set of product display cards oriented in a sequential series of a plurality of cards in registry, each of the cards comprising a body having a front surface and a back surface, a top edge, a bottom edge, and opposing side edges, an aperture provided in each card for receiving a rod or the like suspension device for vertically suspending each card, the apertures establishing stacked registry of the cards with the respective side edges, bottom edges and portions of top edges of each card being in alignment with each other card, but without recourse to external structure for support, and an identification tab formed on and extending from the top edge of each card at a position staggered relative to that of the corresponding tab of each other card in the set whereby, when the cards are displayed in such relative alignment, the view of each tab is unobstructed when viewed from the front of the set.

4,986,422

METHOD OF SCREENING SOLID MATERIALS AND APPARATUS FOR PERFORMING SAME

Valentin N. Poturaev, ulitsa Dzerzhinskogo, 33 g, kv. 10; Alfred G. Chervonenko, naberezhnaya Pobedy, 48, kv. 299; Vladimir L. Morus, ulitsa Gladkova, 4-a, kv. 65, and Viktor A. Lavrukhin, naberezhnaya Pobedy, 60, kv. 117, all of Dnepropetrovsk, U.S.S.R.

Filed Aug. 18, 1989, Ser. No. 396,471
Int. Cl.[5] B07D *1/30*
U.S. Cl. 209—326 9 Claims



1. A method of screening solid materials, including:

feeding a particulate solid material onto a sifting surface of a screening apparatus, the screening apparatus having a loading zone and a discharge zone;

imparting oscillations to said sifting surface under the action of an effort directed at an acute angle β to the longitudinal axis of said sifting surface, for moving particles of the solid material from the loading zone to the discharge zone and in a direction normal to said sifting surface;

moving the particles of the solid materials directly engaging said sifting surface, from the loading zone to the discharge zone, at an acute angle α, with respect to a vertical component of said effort;

limiting the extent of displacement of the solid material particles in the direction normal to said sifting surface;

setting a maximum value of the extent of displacement of the particles of the solid material such that the particles move from the loading zone to the discharge zone along substantially continuous helical paths;

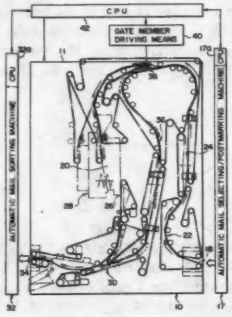
setting a minimum value of the extent of displacement of the particles substantially equal to double the value of the maximum particle size of the solid material being screened.

4,986,423

REGULAR-INTERNAL MAIL FEEDING APPARATUS

Kazuo Takeda, Kawasaki, Japan, assignor to Kabushiki Kaisha Toshiba, Kawasaki, Japan

Filed Jun. 27, 1989, Ser. No. 372,002
Claims priority, application Japan, Jun. 30, 1988, 63-163944
Int. Cl.[5] B07C 1/02
U.S. Cl. 209—540 7 Claims



1. A regular-interval mail feeding apparatus having an inlet and an outlet, comprising:

first conveyor means for receiving mails intermittently fed one by one to a first end thereof, and conveying the mails toward a second end thereof;

storing means disposed at the second end of the first conveyor means for storing a predetermined number of mails discharged from the second end of the first conveyor means, and sending out the stored mails one by one at regular-intervals;

second conveyor means for conveying the mails sent out from the storing means to the outlet of the regular-interval mail feeding apparatus;

third conveyor means for conveying the mails fed to a first end thereof toward a second end thereof, the first end of the third conveyor means being connected to the first conveyor means between the first and second opposite ends, and the second end of the third conveyor means being connected to the second conveyor means;

diverging means for selectively introducing the mails fed to the first end of the first conveyor means to the second end of the first conveyor means or to the first end of the third conveyor means; and

control means for controlling the diverging means so that the mails fed to the first end of the first conveyor means are introduced to the second end of the first conveyor means when the mails are supplied one by one to the first end of the first conveyor means at random intervals, and the mails fed to the first end of the first conveyor means are introduced to the first end of the third conveyor means when the mails are supplied one by one to the first end of the first conveyor means at regular intervals.

4,986,424

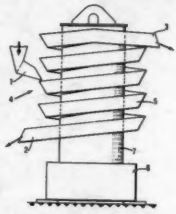
PROCESS AND APPARATUS FOR SEPARTING MATERIALS OF DIFFERENT SHAPES OR SIZES

Georges Berrebi, Bourg Les Valence, and Francois Ackermann, La Voulte Sur Rhone, both of France, assignors to Europeenne de Retraitement, La Voulte Sur Rhone, France

Continuation of Ser. No. 922,491, Oct. 23, 1986, abandoned.
This application Feb. 20, 1990, Ser. No. 481,687
Claims priority, application France, Oct. 23, 1985, 85 15947
Int. Cl.[5] B07C 9/00
U.S. Cl. 209—691 2 Claims

1. A process for fractioning a mixture of relatively large balls having a diameter of approximately 25 mm and a weight of approximately 21 g, relatively small balls having a diameter of approximately 12 mm and a weight of approximately 5 g, and solid chips having a weight in the range of 0.5 g to 15 g, the process comprising the steps of:

providing a spiral ramp coated with a non-metallic material, the ramp having a width in the range of 50 to 400 mm, a slope in the range of 2° to 20°, and a between two turns in the range of 50 to 150 mm, the spiral ramp having a top



exit and a bottom exit with the intermediate location therebetween;

feeding the mixture at an intermediate location on the spiral ramp;

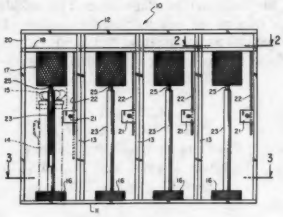
advancing the relatively large balls down the spiral ramp to dispense therefrom at the bottom exit while advancing the chips and relatively small balls up the ramp to dispense therefrom at the top exit by applying a lateral vibration having a lateral amplitude in the range of 0.2 to 15 mm.

4,986,425

SPORTS ACCESSORY STORAGE RACK

Gary T. Gohl, 2048 Watson St., Glendale, Calif. 91201

Filed Jul. 19, 1990, Ser. No. 554,439
Int. Cl.[5] A47F 5/00
U.S. Cl. 211—4 6 Claims



1. A security storage rack for use in combination with a golfclub bag exposing a plurality of golfclubs, said rack comprising:

as elongated frame having a base and an upper member arranged in fixed spaced-apart relationship;

a plurality of receptacles secured to said base in fixed spaced-apart relationship, each of said receptacles adapted to insertably receive the bottom portion of said golf bag;

a plurality of cylindrical bucket members movably carried on said frame adjacent to said upper member and each bucket being coaxially disposed with respect to each one of said receptacles and being adapted to insertably cover the upper portion of said golf bag including said plurality of golfclubs in a capture position;

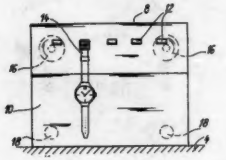
means operably carried on said frame normally biasing said bucket member to a raised release position.

4,986,426

PRESENTATION STAND INTENDED FOR WATCHES

Bruno Niklaus, Biel, Switzerland, assignor to Swatch A.G., Switzerland

Filed Oct. 31, 1989, Ser. No. 429,573
Claims priority, application Switzerland, Nov. 2, 1988, 04075/88
Int. Cl.[5] A47F 7/00
U.S. Cl. 211—13 20 Claims



1. A presentation stand comprising:

a presentation plate having a front face and a rear face and provided with receiving means on said front face adapted to receive at least one object to be presented;

support means having a front face and a rear face and comprising a first extremity coupled to the presentation plate and a second extremity movable to a position in which said second extremity diverges from said plate to support the presentation stand when it is set down on a substantially horizontal surface, in which position the front face of said support means faces the rear face of said presentation plate;

attaching means provided on the rear face of said support means for fastening said presentation stand to a substantially vertical surface when the rear face of said support means is placed opposite said vertical surface;

coupling means provided on the rear face of said presentation plate and the front face of said support means for separably attaching the second extremity of the support means to the presentation plate when the presentation stand is fastened to said vertical surface; and,

a retention plate extending in front of at least a portion of the front face of the presentation plate, said plates being substantially parallel and the distance between them being slightly greater than the thickness of the object to be presented.

4,986,427

STORAGE RACK

Donel G. Law, R.R. 1, Box 232B, Tipton, Ind. 46072, and Harold Powell, Columbus, Ind., assignors to Donel G. Law, Tipton, Ind.

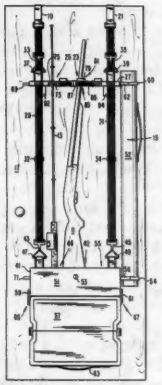
Continuation-in-part of Ser. No. 65,842, Jun. 24, 1987, Pat. No. 4,796,762. This application Oct. 19, 1988, Ser. No. 259,761
The portion of the term of this patent subsequent to Jan. 10, 2006, has been disclaimed.
Int. Cl.[5] A47F 7/00
U.S. Cl. 211—64 23 Claims

1. A storage rack for holding generally elongated gear such as fishing rods, rifles, and shotguns having an upper and a lower end comprising:

a lower support member to be mounted along a vertical wall member and having a top surface and means for suspending said lower support member from the vertical wall member.,

a plurality of means for receiving the lower end of the elongated gear to be stored, at least one of said means for receiving comprising an elongated first recess suitably shaped to receive the butt of a gun, and further comprising a second recess which is smaller than said elongated first recess and which is nested within and below said elongated first recess, said second recess being suitably shaped to receive the butt of a fishing rod therein; and

an upper support member to be mounted along the vertical wall member in association with and vertically above said



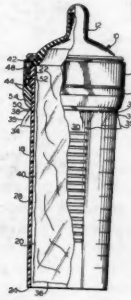
lower support member, said upper support member including means for suspending said upper support member from the vertical wall member and means for holding the upper end of the gear to be stored.

4,986,428

DISPOSABLE NURSER

Alberto Signorini, Rua Engenheiro Alvaro Niemeyer, 113, Sao, Rio de Janeiro, Brazil

Continuation-in-part of Ser. No. 345,723, Jun. 2, 1989. This application Jan. 26, 1990, Ser. No. 470,576
Claims priority, application Brazil, Jun. 8, 1988, 8802780
Int. Cl.[5] A61J 9/00, 9/08
U.S. Cl. 215—11.3 5 Claims



1. A disposable nurser comprising:

a bottle holder comprising a hollow frustum having a first portion and a second portion, having an exterior and an interior surface and having first and second ends, both said ends being open, said second end of said hollow frustum having a smaller circumference than said first end of said hollow frustum;

a flexible bottle having an open end and a closed end and having a first part including said open end and a second part including said closed end, said second part of said flexible bottle removably inserted within said bottle holder, such that said closed end is proximal to said sec-

ond end of said bottle holder and said first part of said flexible bottle extends beyond said first end of said bottle holder, over said first end of said bottle holder, and downward adjacent to said exterior surface of said bottle holder;

a countercap comprising a sleeve having exterior and interior surfaces, having a first end and a second end, and having a first section and a second section, said sleeve so sized and configured that said first end of said sleeve may be slidably mounted over said second end of said bottle holder and said first part of said flexible bottle, such that said first part of said flexible bottle rests between said exterior surface of said bottle holder and said interior surface of said sleeve, and said sleeve may be slid to a stop position, such that said first end of said sleeve is proximal to said first end of said bottle holder;

a stop means located at a predetermined point intermediate said first and said second ends of said bottle holder, such that when said countercap is mounted on said bottle holder, said first end of said countercap is prevented from advancing beyond said stop position;

a nipple removably connected to said first end of said bottle holder;

a nipple holding cap to which said nipple may be removably mounted, said cap having an interior surface; and

an attaching means wherein said nipple holding cap may be removably attached to said countercap, such that said nipple is connected to said first end of said bottle holder and is removably sealed in liquid flow relationship to said flexible bottle.

4,986,429

COLOR INDICATING TAMPER-PROOF SEAL

Robert Singleton, Jr., 1134 East Broadway, South Bend, Ind. 46618

Filed Jun. 12, 1989, Ser. No. 364,660
Int. Cl.[5] B65D *51/18*
U.S. Cl. 215—230 **12 Claims**

1. A tamper-proof seal for sealing a container comprising, in combination, a hermetically sealed frangible envelope, a chamber defined within said envelope, a transparent portion defined in said envelope, a sub-atmospheric pressure within said envelope, indicating means within said chamber having a first visible condition at said sub-atmospheric pressure and a second visible condition at a pressure greater than said sub-atmospheric pressure visibly discernibly different than said first condition whereby fracture of said envelope may be visibly ascertained.

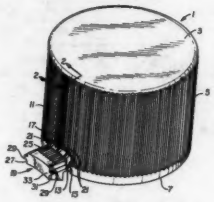
6. A tamper-proof seal employed with a container having a neck and a cap receivable thereon comprising, in combination, a sheet of plastic material tightly affixed to the cap and neck of the container, said sheet of material including a plurality of elongated individual frangible cells, each of said cells extending between the cap and neck and fixed with respect to the cap and to the neck and each filled with a colored visible indicating substance such that when the cap is removed from the neck of the container said cells rupture releasing said indicating substance.

4,986,430

TAMPER EVIDENT CLOSURE WITH TEAR OUT TAB INTEGRALLY MOLDED WITHOUT SLIDES

Herbert V. Dutt, Sarasota, Fla., assignor to Continental Plastics, Inc., Triadelphia, Va.

Filed May 29, 1990, Ser. No. 498,326
Int. Cl.[5] B65D *41/32*
U.S. Cl. 215—253 **10 Claims**



1. A closure for a container having a neck terminating in a container opening, an external thread on said neck, and a transfer bead spaced from said container opening by said external thread, said closure comprising: an end wall, an annular skirt extending axially from said end wall and terminating in a free end, an internal thread on said annular skirt engaging the external thread on the container neck to secure said closure to the container and close said container opening, and a tampering indicator comprising a slot extending generally axially from said free end of said annular skirt, a tear out tab molded to extend laterally outward from said skirt and integrally joined thereto by flexible frangible connection means, said tear out tab being rotatable about said flexible frangible connection means into said slot, cooperative engagement means on said tear out tab and said annular skirt maintaining said tear out tab rotated into said slot, and a projection extending radially inward from said tear out tab to engage the transfer bead on said container neck when the closure is fully threaded onto the container neck and which remains engaged by said transfer bead as said closure is unthreaded to generate a force which fractures said frangible connection means to separate said tear out tab from the annular skirt, thereby providing a visual indication that an attempt has been made to remove the closure from the container.

4,986,431

STORAGE TUBE ASSEMBLIES FOR ROLLED SHEETS

Mary Ann K. McCarter, 9801 Baseline Rd., Elverton, Calif. 95626

Filed Oct. 13, 1988, Ser. No. 257,328
Int. Cl.[5] B65D *1/30*
U.S. Cl. 220—23.2 **7 Claims**

1. A device to segregate, store and carry a plurality of distinct articles, comprising, in combination:

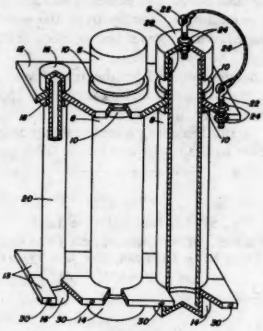
a plurality of storage tubes having top and bottom open ends,

spaced top and bottom flange plate members, each said flange plate member has a plurality of holes, said storage tubes extending between said spaced top and bottom flange plate members and through said holes to constrain said tubes in an array such that each said tube is held in fixed relation with respect to all of said tubes, said tubes having end portions which project beyond said flange plate members,

a plurality of bottom end caps, said bottom end caps attached to said bottom ends, one cap per bottom end and located substantially adjacent said bottom flange plate members thereby sealing said bottom end,

a plurality of top end removable caps dimensioned to fit on said top end, one for each said top end to thereby selec-

tively expose or occlude interiors of said tubes and a plurality of retaining ring means attached on each said top



end adjacent, abutting and fixing said top flange plate member to each said tube.

4,986,432

BAKING-TIN ADAPTED TO COOK AND DISTRIBUTE SWEET THINGS SUCH AS SMALL CAKES, PUDDINGS AND THE LIKE, OR FOOD-STUFFS IN GENERAL

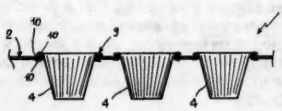
Gianmario Anghileri, Valmadrera, Italy, assignor to Nocacart S.p.A., Valmadrera, Italy

Continuation of Ser. No. 23,576, Mar. 9, 1987, abandoned. This application May 26, 1989, Ser. No. 357,694

Claims priority, application Italy, Apr. 30, 1986, 21697/86[U]

Int. Cl.[5] B65D *1/30, 21/02;* A47G *19/00*

U.S. Cl. 220—23.4 **1 Claim**



1. A tin for baking, cooking and distributing of cakes and food in general, comprising

a plurality of pleated-paper cups adapted to be directly introduced into and lay on an oven, each cup having a pleated top portion formed by a series of consecutive parts extending circumferentially and folded respectively outwardly, inwardly and further outwardly so as to define a peripheral groove between said inwardly folded and said further outwardly folded parts.

a laminar support made of paper material having a plurality of openings going through said support, each of said openings being dimensioned and shaped to receive one of said pleated-paper cups with the peripheral groove removably receiving a portion of the support in the vicinity of the openings, each of said cups being thereby easily removable from the tin by pushing the cups from the bottom thereof and each of said cakes being thereby easily removable from the cups by pulling the further outwardly folded part of the cups, said laminar support having a plurality of fracture lines defining a plurality of support portions, each of said support portion receiving and surrounding at least one said pleated-paper cup, a plurality of shaped holes being defined with the support at places where said fracture lines intersect each other; and

a plurality of engagement seats provided along outer edges of said baking tin and within regions of intersection of said outer edges and said fracture lines, the configuration of the engaging seats corresponding to the configuration of a half of said shaped holes, said engagement seats being adapted for engagement with grasping elements carried by transporting means.

4,986,433

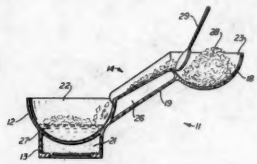
CRISPY CEREAL SERVING PIECE AND METHOD

Alton A. Davis, 4653 Buckline Cir., Dunwoody, Ga. 30338

Filed Jun. 4, 1990, Ser. No. 533,275

Int. Cl.[5] B65D *7/00*

U.S. Cl. 220—23.8 **10 Claims**



1. A serving piece for serving cereal and preventing it from becoming soggy in milk with said serving piece comprising:

a first bowl for receiving milk with said first bowl being adapted to be supported upon a surface in a food containing orientation;

an elongated cereal chute mounted at one end to and communicating with said first bowl;

said cereal chute extending upwardly and outwardly from said first bowl when said first bowl is supported in its food containing orientation; and

a second bowl for receiving cereal with said second bowl being mounted to and communicating with the other end of said cereal chute,

whereby cereal contained in the second bowl can be urged in measured quickly edible portions from the second bowl down the chute and into milk within the first bowl from where it can be consumed before becoming soggy.

4,986,434

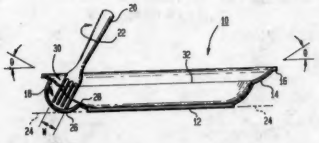
DISH AND METHOD FOR SERVING STRING-FORM FOODS

Robert V. Prestyly, Jr., Melville, N.Y., assignor to Prestileo Industries, Inc., Jackson Heights, N.Y.

Continuation of Ser. No. 583,141, Feb. 24, 1984. This application Nov. 1, 1985, Ser. No. 794,264

Int. Cl.[5] B65D *1/24*

U.S. Cl. 220—83 **5 Claims**



1. A serving container or dish for string-form foods, said container comprising a bottom wall, at least one side wall joined with said bottom wall to form a container, said container having a cavity in said side wall, said cavity being of substantially hemispherical shape and being adapted to receive one end of an eating implement around which strands of said string-form foods can be wound, and being shaped to guide said strands onto said implement when said strands are being wound thereon, said cavity being located adjacent said bottom wall of said dish, in which the wall portion forming said cavity

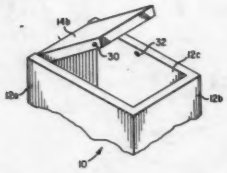
bulges outwardly, the opening of said cavity and the exterior of said wall portion of one dish fits downwardly into the cavity of a dish below it when said dishes are stacked on top of one another.

4,986,435

RECEPTACLE FOR A FLEXIBLE BEVERAGE CONTAINER

Connie Wright, 11606 Shady Grove, Houston, Tex. 77024

Filed Jun. 12, 1989, Ser. No. 364,885
Int. Cl.[5] B65D *21/02*
U.S. Cl. 220—85 H **17 Claims**



1. A receptacle for holding a beverage container, said beverage container having flexible walls and an access port positioned on a top portion of said beverage container, and for shielding said flexible wall container from unwanted pressure exerted on said flexible walls resulting in the expulsion of said fluid from said flexible wall container through a portion of said access port, said receptacle comprising:

a plurality of rigid sidewalls each connected to an adjacent one of said sidewalls;

a bottom connected to at least one of said sidewalls, said sidewalls and said bottom collectively defining a box-like structure having an internal space therein, said structure having an opening for receiving said beverage container; and

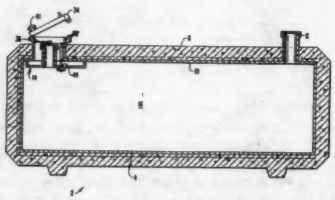
a top piece covering a portion of said opening and cooperating with said sidewalls to secure said beverage container within said internal space, wherein a portion of said opening not covered by said top piece corresponds to the location of said access port of said beverage container when said beverage container is secured within said internal space.

4,986,436

ABOVE GROUND LIQUID STORAGE SYSTEM WITH OVERFILL RESERVOIR

Ralph Bambacigno, Modesto, and Thomas R. Lindquist, Denair, both of Calif., assignors to Convault Inc., Denair, Calif.

Filed Oct. 20, 1989, Ser. No. 424,277
Int. Cl.[5] B65B *3/06*
U.S. Cl. 220—86 R **21 Claims**



1. An improved above ground liquid storage system comprising:

an above ground liquid storage container having an interior and an upper wall with an upper opening in the upper wall;

an overfill reservoir positioned within the interior of the container and below the upper opening;

a fill pipe extending upwardly from the overfill reservoir, the fill pipe having a lower end opening into the container interior and an upper end;

an upper barrier secured to the upper wall at the upper opening, the barrier extending above the upper opening so to seal the upper opening; and

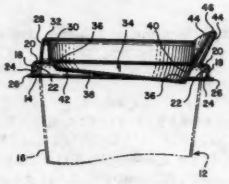
the upper barrier including a removable member to provide user access to the upper end of the fill pipe.

4,986,437

SPILL RESISTANT LID

Herbert B. Farmer, 1070 Windsor, Salt Lake City, Utah 84105

Filed Mar. 18, 1985, Ser. No. 713,417
Int. Cl.[5] A47G *19/22*
U.S. Cl. 220—90.2 **6 Claims**



1. A spill resistant lid adapted to be removably and sealably attached to a an open-topped container, said lid comprising;

a first cylindrical wall adapted to receive in close fitting relationship therein the open top of said container;

a second substantially cylindrical wall being of a smaller diameter than, and substantially concentric with, said first cylindrical wall;

an annular edge interconnecting said first and second walls;

a third substantially cylindrical wall concentric with and connected at its upper edge to said second wall;

a substantially planar floor connected to said third wall in a manner to be inclined slightly relative to the plane of said annular ledge;

an intermediate, bevelled section interconnecting said floor and said third wall, said third wall, said intermediate section, and said floor defining a reservoir for holding liquid therein, said intermediate section including an oval discharge hole oriented radially lengthwise therein for the passage of liquid therethrough; and

said second and third cylindrical walls defining a spout in radial alignment with said discharge hole in said intermediate section.

4,986,438

RECLOSEABLE NESTING TAB CONTAINER

Rodney D. Borst, Oregon, Wis., assignor to Placon Corporation, Madison, Wis.

Filed Apr. 3, 1990, Ser. No. 504,316
Int. Cl.[5] B65D *45/00*
U.S. Cl. 220—315 **9 Claims**

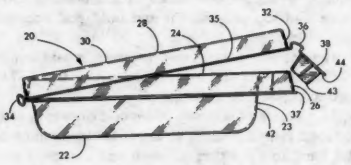
1. A flexible reclosable thermoformed thermoplastic container comprising:

(a) a base having upwardly extending side walls, with a peripheral shoulder extending outwardly from the side walls and a rim wall depending downwardly from the shoulder;

(b) a cover having a top with downwardly extending side walls, the cover being adapted to close upon and cover the base; and

(c) a locking tab having two spaced opposed faces and at-

tached by an integral hinge to a cover side wall so that when the cover is folded down to cover the base, the locking tab may be rotated about the integral hinge and



inserted in an upward direction toward the peripheral shoulder to fit snugly between a base side wall and the base rim wall to retain the cover closed on the base.

4,986,439

CAP FOR THE FILLER NECK OF LIQUID CONTAINERS

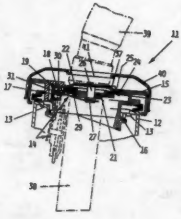
Siegfried Ott, Waginger Strasse 46, 8221 Traunstein-Hufschlag, Fed. Rep. of Germany, and Friedrich Wimmer, Oberholzleiten 15, 5231 Schalchen, Austria

Filed Nov. 21, 1989, Ser. No. 439,691

Claims priority, application Fed. Rep. of Germany, Jun. 9, 1989, 3918947

Int. Cl.[5] B65D *43/16*

U.S. Cl. 220—334 **7 Claims**



1. A self-closing cap for the filler neck of liquid containers, consisting of a closure ring having an annular seal, said ring being attachable to said filler neck, and of a spring-biased closure flap swivel-mounted on said closure ring and provided with a seal, wherein said closure flap **(14)** is swivel-mounted with two bearing arms **(20)** to a shaft **(30)** supported by a bearing block **(17)** inserted in a recess **(18)** on the housing ring **(15)** and wherein a locking spring **(31)** seated on said shaft **(30)** of said bearing block **(17)** biases said closure flap **(14)**, with one on end **(29)** of said spring engaging said closure flap **(14)** or a bearing arm **(20)** and the other end **(32)** engaging said bearing block **(17)**.

4,986,440

DISPENSER FOR A STACK OF NOTE PAPER

David C. Windorski, St. Paul, Minn., assignor to Minnesota Mining and Manufacturing Company, Saint Paul, Minn.

Division of Ser. No. 202,138, Jun. 3, 1988, Pat. No. 4,921,127, which is a continuation-in-part of Ser. No. 29,172, Mar. 23, 1987, Pat. No. 4,796,781. This application Dec. 12, 1989, Ser. No. 448,986

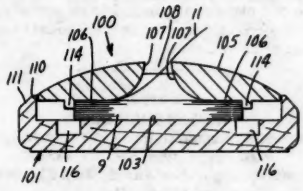
Int. Cl.[5] B65H *1/00*

U.S. Cl. 221—45 **4 Claims**

1. A dispenser for sheets of note paper disposed in a stack having upper and lower surfaces with each of said sheets having a narrow band of adhesive coated on one surface along one edge by which the sheets are adhered together and with the sheets being stacked with the band of adhesive of adjacent sheets at alternate opposite edges of the stack, said dispenser comprising:

a base part having a bottom surface adapted to be supported on a horizontal support surface and a top surface comprising a generally planar support surface portion adapted to support the lower surface of the stack;

a body part having a top surface, and a bottom surface including spaced pressure surface portions adapted to engage and be supported on the upper surface of the stack adjacent the edges of the sheets along which the narrow bands of adhesive are coated with the spaced pressure surface portions engaging the upper surface of the sheets at predetermined distances from the edges of the sheets along which the narrow bands of adhesive are coated, and convex arcuate surface portions between said pressure surface portions and said top surface defining a slot through and extending centrally across said body part, said convex arcuate surface portions having radii with a dimension as least as large as said predetermined distances to restrict curling of sheets of paper pulled from the dispenser through the slot, said body part having sufficient



weight to afford pulling a sheet from the stack through the slot without substantially lifting the body part from the stack;

means for positioning said body part above said base part comprising said base part having a generally cylindrical periphery disposed at generally a right angle to said support surface portion and said body part having a generally cylindrical peripheral wall adapted to project along said periphery with the stack between said parts; and

means for locating the stack with the edges of the sheets along which the narrow bands of adhesive are coated generally parallel to said arcuate surface portions and with said slot extending generally transversely across the stack centrally between those edges comprising said body part having locating lugs projecting toward said base part adapted to receive opposite sides of the stack in close fitting relationship said base part having a circular groove recessed from said support surface portion adapted to receive said locating lugs in any orientation of said slot transverse to said base part to afford dispensing the last sheets in the stack.

4,986,441

VENDING MACHINE USING ONE TAKEOUT PORTION FOR A CONVEYOR RACK AND A SERPENTINE RACK

Toru Kanbe, Ota; Masayuki Taguchi, Isesaki, and Katsunobu Sato, Isesaki, all of Japan, assignors to Sanden Corporation, Gunma, Japan

Filed Mar. 16, 1989, Ser. No. 324,101

Claims priority, application Japan, Mar. 16, 1988, 63-33641[U]

Int. Cl.[5] G07F *11/00*; B65G *59/00*

U.S. Cl. 221—130 **20 Claims**

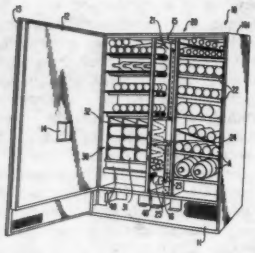
1. A vending machine comprising:

a cabinet having a takeout portion;

a conveyor rack, disposed within said cabinet, for storing first merchandise;

a serpentine rack, disposed within said cabinet, for storing second merchandise;

first means, disposed within said cabinet, for transferring the first merchandise from said conveyor rack to said takeout portion of said cabinet if the user selects the first merchandise; and



second means, disposed within said cabinet, for transferring the second merchandise from said serpentine rack to said first transferring means for delivery to said same takeout portion of said cabinet.

4,986,442

TABLET DISPENSER

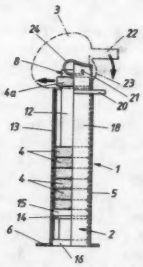
Ignaz Hinterreiter, Ramsauerstrasse 119, A-4020 Linz, Austria

Filed Jun. 8, 1989, Ser. No. 363,543

Claims priority, application Austria, Jun. 22, 1988, 1611/88

Int. Cl.[5] B65H *1/08*

U.S. Cl. 221—229 **9 Claims**



1. In a tablet dispenser comprising

a tubular protective housing having a top end and provided at said top end with inwardly protruding detent means,

a drawer, which is axially slidably mounted in said housing and protrudes from said housing at said top end and is adapted to be upwardly extracted from said housing to a top position, in which said drawer engages said detent means,

a columnlike stack of tablets, which is contained in said drawer and comprises a plurality of tablets, each of which is in sliding contact with said drawer and said protective housing, said drawer being adapted to receive such a stack of tablets when said drawer is in said top position,

two mutually opposite side guides, which are mounted on said housing and extend above said top end thereof and are adapted to receive one of said tablets from said stack and to guide said one tablet transversely to the axis of said drawer, and

an ejector, which is movably mounted in said drawer outside said protective housing and is operable to eject said one tablet on one side of said drawer transversely to the axis of said drawer when said one tablet is disposed between said side guides,

the improvement residing in that

said side guides comprise laterally spaced apart clamping holders, which are connected to said housing and extend above said top end thereof and hold said one tablet between them,

said drawer has a bottom end disposed in said housing and near said bottom end is provided with a foot, which supports said stack of tablets, and

after the ejection of said one tablet said drawer is adapted to be raised in said housing to move the uppermost tablet of said stack to a position between said clamping holders.

4,986,443

METHOD OF DISCHARGING A SUBSTANCE FROM A CARTRIDGE AND AN APPARATUS FOR CARRYING OUT THE METHOD

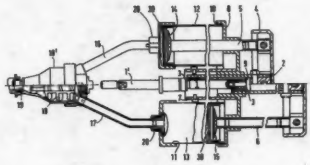
Wolfgang Saur, Buttikon; Robert Tonolla, Thalwil, both of Switzerland; Franz Taschke, Stuttgart, and Siegfried Staemmele, Winnenden, both of Fed. Rep. of Germany, assignors to Gurit-Essex AG, Switzerland

Filed Jul. 6, 1989, Ser. No. 376,312

Claims priority, application Fed. Rep. of Germany, Jul. 13, 1988, 3823708; Switzerland, Jul. 19, 1988, 2749/88

Int. Cl.[5] B67D *5/00*

U.S. Cl. 222—1 **15 Claims**



4. An apparatus for dispensing a substance which must be stored in the absence of air comprising:

a cartridge containing said substance to be dispensed, said cartridge having an outlet opening covered by a sealing member and a piston member inserted into the cartridge at the end opposite to said outlet opening, said piston member sealingly closing said end opposite to said outlet opening and being slidably received in the interior of the cartridge;

means for sliding said piston member into the cartridge to thereby exert a pressure on said substance contained in the cartridge;

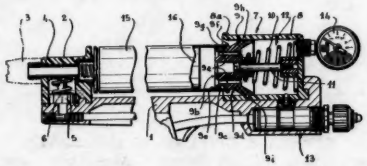
said cartridge comprising a connection piece provided at said outlet end and a coupling member mounted on said connection piece, said coupling member having an inner wall portion and an outer wall portion, said inner and outer wall portions defining an immersion chamber, said coupling member including a cutting member and a supporting member for said connection piece, said immersion chamber having a depth sufficient to enable the cartridge to be displaced with reference to said coupling member under the influence of a force exerted on said end opposite of said outlet of the cartridge to such an extent that said sealing member covering said outlet opening of the cartridge runs against said cutting member during said displacement of the cartridge and is cut open sufficiently such that said sealing member does not withstand the pressure of the substance any longer and reaches a position where a flow path for said substance is opened.

4,986,444

GUNS INTENDED FOR EXTRUDING PASTRY PRODUCTS

Dominique Corso, Rue de la Plaine, 38230 Charvieu, France

Filed Sep. 13, 1989, Ser. No. 408,908
Claims priority, application France, May 9, 1989, 89 06328
Int. Cl.[5] B05C *17/005*; B67D *5/46*
U.S. Cl. 222—23 **10 Claims**



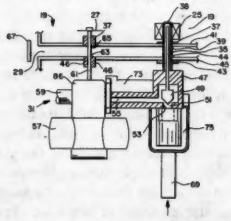
1. In a gun for dispensing pasty products which includes a cylinder into which compressed gas is charged and which gas passes through a piston seal member which substantially closes one end of the cylinder so that the gas is directed through a cartridge to a piston means which acts to discharge a product from a supply container through a nozzle, the improvement comprising; said piston seal member having inner and outer ends and an outer surface, said inner end being in sealing engagement with the one end of the cylinder, first and second peripheral grooves in the outer surface of said piston seal member and spaced inwardly of said outer end thereof, a first radial lip of a first diameter formed between said first groove and said outer end, a second radial lip of a second diameter which is larger than said first diameter formed between said first and second grooves, said inner end being formed as a conical skirt extending radially outwardly relative to said second groove and having a diameter greater than said second diameter, and at least one gas passage way extending through said piston seal member whereby when gas pressure is supplied to the cylinder, such pressure will act to force one of said first and second radial lips into a sealed engagement with the cartridge.

4,986,445

GASOLINE DISPENSER WITH VALVE CONTROL THROUGH AN AIR GAP

Harold R. Young, Kernersville; John S. McSpadden, Greensboro; James R. McMordie, Winston Salem, and Leon B. Smith, Greensboro, all of N.C., assignors to Gilbarco Inc., Greensboro, N.C.

Filed Dec. 4, 1989, Ser. No. 445,466
Int. Cl.[5] B67D *5/16*
U.S. Cl. 222—71 **27 Claims**



1. A fuel dispenser system for substantially eliminating explosion proof housings for electrical apparatus, and/or intrinsically safe electrical apparatus requirements, comprising:

a housing,

first partition means for partitioning a portion of said housing into a safe or unclassified zone within a first enclosure for containing electrical devices, including electrical elements of electromechanical devices;

second partition means for partitioning another portion of said housing into a hazardous zone within a second enclosure, for containing mechanical apparatus, including the mechanical elements associated with said electromechanical devices;

air gap means for providing an air gap between said first and second enclosures, for isolating fuel vapor and fumes that may develop within said second enclosure from said first enclosure to provide a first vapor barrier; and

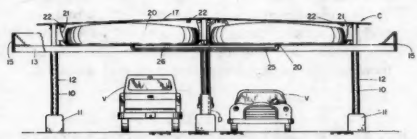
first bifurcated electromechanical valve means including an electrical control portion mounted within said first enclosure, a valve body including mechanical control means for controlling the flow of fuel therethrough, mounted within said second enclosure, and mechanical linkage means connected from said electrical control portion, through said air gap, to said mechanical control means, said electrical control portion being operable for positioning said mechanical linkage means to selectively operate said mechanical control means for establishing a desired flow rate of fuel through said valve body.

4,986,446

SERVICE STATION IMPROVEMENTS

Jerry A. Montgomery, and Larry S. Parkhurst, both of Houston, Tex., assignors to Southwest Canopy Company, Houston, Tex.

Continuation-in-part of Ser. No. 228,733, Aug. 5, 1988, abandoned. This application Dec. 1, 1989, Ser. No. 444,403
Int. Cl.[5] B67D *5/64*
U.S. Cl. 222—94 **7 Claims**



1. A service station for dispensing fuel to vehicles, said service station having fuel dispensers connected by fluid conduits to fuel storage means, said station being characterized in that said fuel storage means comprises at least one self-supported, self-contained, flexible and collapsible bladder type tank and an open top containment vessel into which said bladder type tank may be lowered for nonattached disposition so that any leakage due to a puncture in said bladder type tank would be totally contained by said containment vessel, said bladder type tank and said containment vessel being installed in an elevated position above said fuel dispensers and the vehicles to which fuel is to be dispensed.

4,986,447

BEVERAGE DISTRIBUTION SYSTEM

Gerald P. McCann, Los Angeles, and Andrew J. Holoubek, Burbank, both of Calif., assignors to McCann's Engineering and Manufacturing, Co., Los Angeles, Calif.

Continuation-in-part of Ser. No. 195,947, May 19, 1988, Pat. No. 4,928,854. This application Jun. 30, 1989, Ser. No. 374,088
The portion of the term of this patent subsequent to May 29, 2007, has been disclaimed.
Int. Cl.[5] B67D *5/56*
U.S. Cl. 222—129.1 **4 Claims**

1. A superflow diffuser and spout assembly for use with a liquid dispensing apparatus, comprising:

a body,

an inlet in said body for receiving a supply of carbonated water,

an inlet in said body for receiving a supply of syrup,

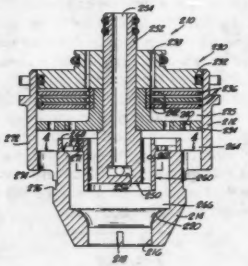
a diffuser assembly in said body through which at least a portion of said carbonated water supply passes prior to being dispensed,

a spout attached to said body,

a flow separator within the path of said carbonated water supply,

a syrup distributor in said spout for distributing said supply of syrup into a plurality of streams,

wherein said flow separator is operative to separate said carbonated water supply into at least three streams, a first



stream directed to flow along an outside surface of said spout, a second stream directed to flow through said spout, a third stream directed through said syrup distributor, wherein said second stream flowing through said spout mixes with syrup distributed from said syrup distributor, and said third stream of carbonated water mixes with said second stream of carbonated water then mixed with syrup, wherein and said fist stream of carbonated water and said second stream of carbonated water, then mixed with syrup and said third stream of carbonated water, meet for dispensing downstream of said spout.

4,986,448

BEVERAGE DISPENSING UNIT WITH A CONTROL UNIT FOR CONTROLLING DISPENSATION OF A BEVERAGE

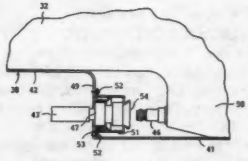
Yutaka Takahashi, Kanagawa; Ikuo Harashima, Gunma; Shunichi Nakayama, Gunma; Yasuyuki Arai, Gunma; Yasushi Takayanagi, Gunma; Ryoichi Sekiguchi, Gunma; Tomomitsu Abe, Kanagawa, and Hiroshi Hayakawa, Kanagawa, all of Japan, assignors to Sanden Corporation, Gunma and Kirin Brewery Co., Ltd., Tokyo, both of, Japan

Filed Feb. 22, 1989, Ser. No. 313,504

Claims priority, application Japan, Feb. 22, 1988, 63-37407; Feb. 27, 1988, 63-43301

Int. Cl.[5] B67D *5/56*

U.S. Cl. 222—129.1 **9 Claims**



1. In a dispensing unit for dispensing a beverage, including storing means for storing said beverage, conducting means coupled to said storing means for conducting said beverage from said storing means, and supporting means for supporting said storing means, said conducting means including an end portion which is detachably connected to said storing means, said supporting means having a connecting axis, the improvement wherein said storing means is removable from said supporting means; and

said dispensing unit further comprising:

holding means for holding said end portion of said conducting means so that said end portion is radially movable about said connecting axis; and

fixing means coupled to said holding and said supporting means for fixing said holding means to said supporting means.

4,986,449

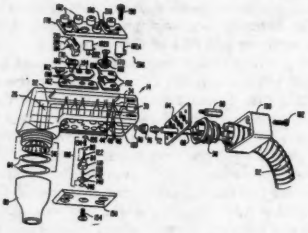
BEVERAGE DISPENSING APPARATUS

Mojtaba Valiyee, Moraga; William A. Martindale, and Richard A. Martindale, both of Vacaville, all of Calif., assignors to Automatic Bar Controls, Inc., Vacaville, Calif.

Filed Aug. 12, 1988, Ser. No. 231,753

Int. Cl.[5] B67D *5/60*

U.S. Cl. 222—144.5 **32 Claims**



1. In a beverage dispensing head of the type for use with pressurized sources of base and mixing fluids coupled to the head by a plurality of fluid conduits, the head including a plurality of fluid passageways connecting the fluid conduits to a discharge nozzle with associated base and mixing fluid valves controlling the flow of fluid along the passageways, the base and mixing fluid valves including base and mixing fluid valve stems which move between valve closed and valve open positions for selectively closing and opening the base and mixing fluid valves, the base and mixing fluid valve stems being biased in the valve closed position, the improvement comprising:

a plate disposed over a base fluid valve stem and a mixing fluid valve stem, the plate having an opening located over the base fluid valve stem capable of receiving the base fluid valve stem therethrough, and the plate having a rigid surface disposed over the mixing fluid valve stem; and

first plate moving means for moving the plate toward the base and mixing fluid valve stems so that the rigid surface of the plate causes the mixing fluid valve stem to be in the valve open position, and so that the base fluid valve stem passes through the opening in the plate for maintaining the base fluid valve stem in the valve closed position; and

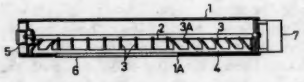
second plate moving means for moving the plate toward the base and mixing fluid valve stems, the second plate moving means including base fluid valve stem impeding means for impeding the passage of the base fluid valve stem through the opening in the plate, so that the rigid surface of the plate causes the mixing fluid valve stem to be in the valve open position, and so that the base fluid valve stem impeding means impedes the passage of the base fluid valve stem through the opening in the plate and causes the base fluid valve stem to be in the valve open position.

4,986,450

TONER CARTRIDGE

Shinichiro Yasuda, and Yasunori Inagaki, both of Wakayama, Japan, assignors to Kao Corporation, Tokyo, Japan

Filed Sep. 15, 1989, Ser. No. 407,935
Claims priority, application Japan, Sep. 19, 1988, 63-122321; Sep. 19, 1988, 63-122322
Int. Cl.[5] B67D 5/64
U.S. Cl. 222—169 5 Claims



1. A toner cartridge comprising a cylindrical cartridge body having a toner discharge port formed in a part of a peripheral surface thereof, a pivot shaft disposed along a longitudinal axis of said body and a toner pressure feeding member within said cartridge body joined to said pivot shaft through a plurality of connecting rods and adapted to discharge toner contained in said body from said toner discharge port, said toner pressure feeding member being disposed in parallel with said pivot shaft and along a portion of said cartridge body length which includes said discharge port said connecting rods corresponding to the pressure feeding member of said toner discharge port being perpendicular to said pivot shaft while the remaining connecting rods are diagonally disposed with respect to said pivot shaft, said diagonal connecting rods being provided where they connect with said pivot shaft with a counter guiding portion to direct other towards the outlet.

4,986,451

DISPENSING DEVICE FOR SOLUBLE OR DISPERSIBLE MATERIAL

Christopher H. Lowe, 21 Charleston Ct., Forrestfield, Furnace Green, Crawley, Sussex RH10 6PT, United Kingdom, and Nicholas J. Allen, Flat 2, 23 Hampstead Lane, Highgate, London N.6, United Kingdom

Continuation-in-part of Ser. No. 133,534, Dec. 16, 1987, Pat. No. 4,860,929. This application Jul. 10, 1989, Ser. No. 377,477
Claims priority, application United Kingdom, Dec. 16, 1986, 8629966
The portion of the term of this patent subsequent to Aug. 29, 2006, has been disclaimed.
Int. Cl.[5] A47J 31/00; B65B 29/02
U.S. Cl. 222—189 15 Claims

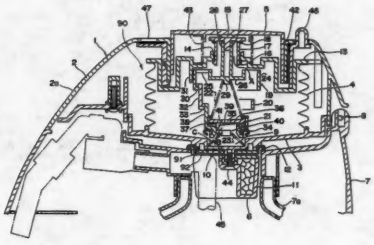
1. A dispensing device for a soluble for dispersible material, which device comprises a tube formed of a liquid-impermeable material and of unitary construction, the tube being closed at both ends and having perforations along a portion of it length at or close to one end, and containing a soluble or dispersible material, said dispensing device being entirely formed from a flexible cylindrical plastic tube of continuous unitary thin walled construction as found in a straw.

4,986,452

PUMPING DEVICE FOR LIQUID CONTAINERS

Toyohiko Takatsuki, Izumi; Masahiro Yoshida, Nara; Konomu Sugimoto, Sakai, and Ryoichi Sakaguchi, Ikoma, all of Japan, assignors to Zojirushi Corporation, Osaka, Japan

Filed Apr. 18, 1989, Ser. No. 340,041
Claims priority, application Japan, Apr. 19, 1988, 63-97687; Jan. 13, 1989, 1-7258
Int. Cl.[5] B65D 37/00
U.S. Cl. 222—209 8 Claims



5. A pumping device for a liquid container comprising;
a bellows body with upper and lower plates, said upper plate having a suction port adapted to be communicated with atmosphere, said lower plate having an exhaust port communicated with the interior of said liquid container through a passage formed between said exhaust port of the bellows body and said container;
a suction valve attached to said upper plate to open and close said suction port;
a bellows return spring adapted to expand said bellows body; and
a stop valve assembly arranged in said passage and forming a bypath for communicating the interior of said bellows body and the interior of said container, said stop valve assembly comprising a main path for communicating the interior of said bellows body and the interior of said container, a flap valve adapted to close and open said main path to allow the air only to flow from the bellows pump to said container during operation of said bellows body, and valve means for closing said bypath during operation of said bellows body.

4,986,453

ATOMIZING PUMP

Jean-Pierre Lina, Le Neubourg; Hervé Pennaneach, Verneuil sur Avre, both of France; Efrem M. Ostrowsky, Highland Park, and David G. Moore, Algonquin, both of Ill., assignors to The Pittway Corporation, Northbrook, Ill.

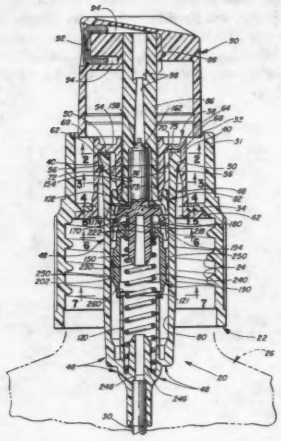
Continuation-in-part of Ser. No. 351,953, May 15, 1989. This application May 16, 1989, Ser. No. 352,778
Int. Cl.[5] B65D 88/54
U.S. Cl. 222—321 56 Claims

1. A finger-operated pump comprising:
a pump chamber;
a supply conduit communicating with said pump chamber;
a movable sealing conduit for movement between a raised, unactuated position and a range of lowered, actuated positions in which said sealing conduit slidably and seal-

ingly engages said supply conduit in a telescoping relationship;

a primary piston operably disposed in said chamber for movement between a raised, unactuated rest position and a range of lowered, actuated positions, said primary piston defining a discharge passage out of said pump chamber;

a poppet having a primary valve means for occluding flow through said discharge passage and having a secondary valve means for occluding flow through said sealing conduit, said poppet being movable a limited amount relative



to said sealing conduit when said sealing conduit is engaged with said supply conduit; and

spring means for (1) biasing said poppet primary valve means against said primary piston to urge said primary piston toward its said raised, unactuated, rest position and (2) engaging both said poppet and sealing conduit after actuation of said pump to return said sealing conduit to its said raised, unactuated rest position and maintain said poppet primary valve means biased against said primary piston in its said raised, unactuated position.

4,986,454

PORTABLE DISPENSER FOR VISCOUS MATERIAL

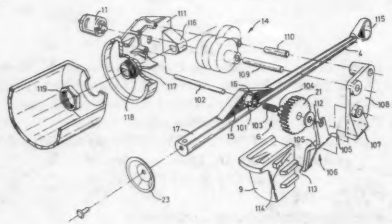
Martyn F. Riley, Newcastle-upon-Tyne, England, assignor to Eaton Hall Design Workshops Limited, Cheshire, England

Filed May 22, 1989, Ser. No. 354,774

Claims priority, application United Kingdom, May 20, 1988, 8812039

Int. Cl.[5] B05B *11/02*; F16H *3/44*

U.S. Cl. 222—327 **16 Claims**



1. A portable dispenser for dispensing viscous material, comprising a dispenser body having a holder portion configured to receive a cartridge of viscous material to be dispensed, displaceable plunger means supported in said dispenser boy for displacement in a dispensing direction to force the viscous material from the cartridge, said plunger means having a rack which is driven by a pinion to displace said plunger means in said dispensing direction, and motor-driven gear train means disposed in said dispenser body for driving said pinion to effect said displacement of said plunger means, said dispenser body including an upper body portion carrying said plunger means and said pinion and a lower body portion carrying at least part of said gear train, said upper body portion being hingedly connected to said lower body portion such that said dispenser body may be opened to uncoupled said pinion from said part of said gear train carried by said lower body portion to permit manual displacement of said plunger means in a direction opposite to said dispensing direction and such that said dispenser body may be closed to couple said pinion to said part of said gear train carried by said lower body portion to enable driving said plunger means in said dispensing direction through said gear train.

7. A portable dispenser for dispensing viscous material, comprising a dispenser body having a holder portion configured to receive a cartridge of viscous material to be dispensed, displaceable plunger means supported in said dispenser body for displacement in a dispensing direction to force the viscous material from the cartridge, said plunger means having a rack which is driven by a pinion to displace said plunger means in said dispensing direction, motor-driven gear train means disposed in said dispenser body for driving said pinion to effect said displacement of said plunger means, and means for coupling said pinion to said gear train to enable driving said plunger means in said dispensing direction and for uncoupling said pinion from said gear train to permit manual displacement of said plunger means in a direction opposite to said dispensing direction, said coupling and uncoupling means including a first clutch member drivingly connected to said pinion and a second clutch member drivingly connected to said gear train and displaceable relative to said first clutch member into and out of driving engagement with said first clutch member, squeeze actuated trigger switch means for actuating the drive motor for said gear train, and means cooperable with said trigger switch means to force said clutch members into engagement upon squeezing of said trigger switch means and for disengaging said clutch members upon release of said trigger switch means.

4,986,455

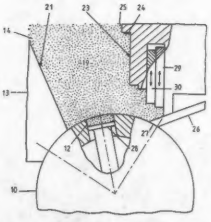
ARRANGEMENT FOR SUPPLYING AND DOSING LOOSE FILLING MATERIAL

Adolf Rambold, Meerbusch, Fed. Rep. of Germany, assignor to Teepack Spezialmaschinen GmbH & Co. KG, Meerbusch, Fed. Rep. of Germany

Filed Jul. 6, 1988, Ser. No. 215,557

Int. Cl.[5] G01F *11/10*

U.S. Cl. 222—368 **2 Claims**



1. An arrangement for supplying and dosing a loose filling material, comprising a dosing wheel rotatable in a predetermined direction and having a plurality of dosing chambers movable long a movement path; means forming a filling chamber arranged above the movement path of said dosing chamber

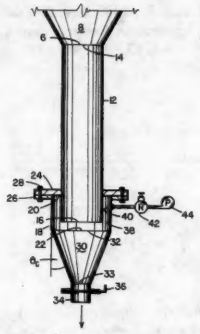
and limited from below by said dosing wheel and also limited in direction of rotation by an end wall having a lower edge; a stripper arranged in the region of said lower edge and abutting against said dosing wheel; and means for substantially maintaining a constant filling pressure over a whole opening cross-section of said filling chamber, said maintaining means including a plurality of members having a stepped configuration and disposed on said end wall of said filling chamber, said members being varied in height in response to variations of filling pressure of said filling chamber, so that the filling pressure substantially remains constant by varying the volume of said filling chamber.

4,986,456

FLOW RATE CONTROLLER AND FEEDER

Jerry R. Johanson, San Luis Obispo, Calif., assignor to JR Johanson, Inc., San Luis Obispo, Calif.

Filed Dec. 5, 1989, Ser. No. 446,058
Int. Cl.[5] B65D *47/00*
U.S. Cl. 222—561 **15 Claims**



7. Apparatus for use in controlling the flow rate of solid particulate material from a storage hopper, comprising in combination:

a first pipe having an upper end connected to the bottom of the storage hopper for receiving solid particulate material from it, extending vertically downward to a lower end, but not converging downwardly;

a second pipe, of larger diameter than said first pipe, extending vertically downward from an upper end to a lower end, the upper end of said second pipe being higher than the lower end of said first pipe so that a space of annular cross section is defined between said first pipe and said second pipe;

first means sealingly engaging said first pipe and said second pipe and forming an upper boundary to the space of annular cross section;

a mass flow hopper having an upper end that is attached to the lower end of said second pipe, the space of annular cross section opening downwardly into said mass flow hopper, said mass flow hopper converging downwardly from its upper end to a lower end;

an outlet affixed to the lower end of said mass flow hopper and including second means for controlling the flow of the solid particulate material from said mass flow hopper; and,

third means connected to said first means for supplying air under pressure to the space of annular cross section.

4,986,457

CLOSED LOOP CABLE SYSTEM

F. Dale Faris, San Diego County, Calif., assignor to Lucky Line Products, San Diego, Calif.

Filed Feb. 8, 1990, Ser. No. 476,823
Int. Cl.[5] E05B *69/00, 69/02*
U.S. Cl. 223—1 **8 Claims**

1. A garment theft prevention system comprising:

(a) a length of cable of sufficient length to pass longitudinally through at least one sleeve of a coat such that the ends meet;

(b) two ferrules mounted respectively on each end of said length of cable; and,

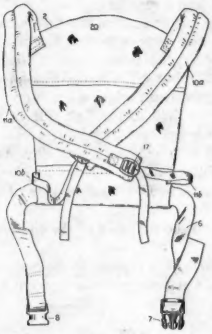
(c) said ferrules being respectively male and female and matable together to be crimped together such that an inseparable closed loop is formed by said length of cable.

4,986,458

INFANT CARRIER

Linda A. Linday, 340 W. 55th St. 9B, New York, N.Y. 10019

Filed Aug. 16, 1988, Ser. No. 232,689
Int. Cl.[5] A45F *3/04*
U.S. Cl. 224—160 **12 Claims**



1. An infant carrier including a pouch having upper left and right corners and a transversely extending lower edge, and a harness attached to said pouch and including shoulder strap means and girth strap means, wherein said shoulder strap means includes a first shoulder strap secured at one end to said pouch in the region of said upper left corner and extending diagonally down and across said pouch to a location in the region of the right end of said lower edge at which the other end of said first strap is secured to said pouch and a second shoulder strap secured at one end to said pouch in the region of said upper right corner and extending diagonally down and across said pouch to a location in the region of the left end of said lower edge at which the other end of said second strap is secured to said pouch, and wherein said girth strap means is independently slidable within a sheath formed along said lower

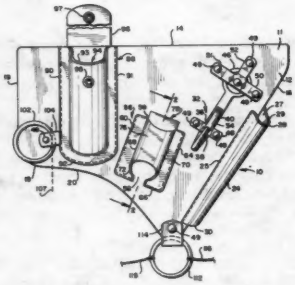
edge of the pouch and has cooperating coupling means operable to couple opposite end portions of said girth strap means extending from said sheath, whereby said pouch may be slung in selected positions including on the front, back and on the side of the wearer, and whereby said pouch may be transferred from one selected position to another while it is supported on the wearer by one of said shoulder straps and said girth strap, said transfer being facilitated by the slidable relationship between said girth and said sheath.

4,986,459

TOOL HOLDER

Charles R. Yarbrough, Jr., 316 Ingleside Dr., Fredericksburg, Va. 22405

Filed Jan. 16, 1990, Ser. No. 465,427
Int. Cl.[5] A45F *5/00*; F42B *39/02*
U.S. Cl. 224—253 **22 Claims**



1. A tool holder, comprising:

a pliable support having a first side, a second side, a top edge, a front edge inclined at a first acute angle with respect to the top edge, and a rear edge;

a first pocket for holding a pen, the first pocket having a top edge, a first side edge attached to the first side of the support adjacent the front edge of the support, and a second side edge attached to the second side of the support adjacent the front edge of the support;

a hook means attached to the first side of the support for holding a bottle opener;

a second pocket attached to the first side of the support for holding a lighter;

a third pocket attached to the first side of the support for holding a knife;

a ring attached to the first side of the support for holding a towel; and

a means for securing the support to the body of a user so that the second side of the support is adjacent a hip of the user.

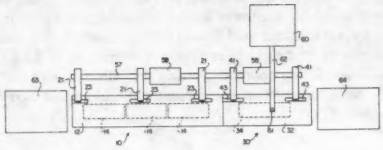
4,986,460

APPARATUS FOR MANUFACTURING SEMICONDUCTOR DEVICES

Nobuto Yamazaki; Hiroshi Ushiki, and Kenji Katakubo, all of Tachikawa, Japan, assignors to Kabushiki Kaisha Shinkawa, Tokyo, Japan

Filed Jun. 30, 1989, Ser. No. 374,542
Claims priority, application Japan, Jul. 4, 1988, 63-166543
Int. Cl.[5] B23K *20/00*; H05K *3/00*
U.S. Cl. 228—4.5 **4 Claims**

1. An apparatus for manufacturing semiconductor devices characterized in that said apparatus comprises a curing oven which cures samples consisting of dies bonded to lead frames by means of an adhesive, a wire bonder which is installed adjacent to and in line with said curing oven, said wire bonder wire-bonding said samples that have been cured by said curing oven, said wire bonder being further equipped with a bonding head which drives a bonding tool in X and Y directions and vertically, a sample-feeding mechanism which feeds said samples into said curing oven and from said curing oven into a bonding part of said wire bonder, a housing for said curing



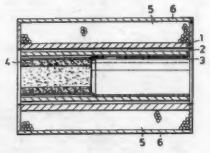
oven and said wire bonder, guide grooves formed in said housing for guiding said samples, a lid which is fastened to an upper surface of said housing, and a heating block provided in said housing.

4,986,461

METHOD OF CONSTRUCTING TOOLS INTENDED FOR USE IN WORK CARRIED OUT WITH THE AID OF SHOCK-WAVE GENERATING ENERGY SOURCES

Per I. Persson, Nora, Sweden, assignor to Exploweld AB, Nora, Sweden

Filed Aug. 31, 1989, Ser. No. 400,938
Claims priority, application Sweden, Sep. 6, 1988, 8803130
Int. Cl.[5] B23K *1/00*
U.S. Cl. 228—57 **6 Claims**



1. A method for the construction and manufacture of a compound tool which is intended to carry out work with the aid of shock-wave generating energy sources, wherein the tool includes tool material and porous material, comprising the steps of bringing said porous material into contact with said tool material, and providing that said porous material has approximately the same shock wave impedance as said tool material, thereby enabling a shock wave induced in said tool material to pass over into said porous material.

4,986,462

METHOD FOR CLEANING AND/OR FLUXING CIRCUIT CARD ASSEMBLIES

Gary L. Hethcoat, Ontario, Calif., assignor to General Dynamics Corporation, Pomona, Calif.

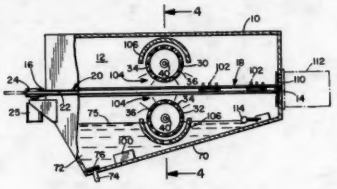
Filed Mar. 2, 1988, Ser. No. 164,170
Int. Cl.[5] B23K *1/20*; H05K *3/34*
U.S. Cl. 228—180.1 **9 Claims**

1. A process for cleaning or fluxing circuit card assemblies with a liquid which comprises;

moving said assemblies through a substantially liquid-tight enclosure on a generally horizontal path extending from one end of said enclosure to the other end;

spraying said assemblies with said liquid simultaneously from above and below said path while said assemblies move along said path, said sprays being dispensed from rotating dispensing means whose linear surface speed parallel to said path is greater than the speed of travel of said assemblies along said path such that the instantaneous angle at which the spray encounters said assemblies varies

as a function of both the linear travel of the assemblies along said path and the rotation of said spray dispensing means, and,



draining a substantial portion of said liquid from said assemblies.

4,986,463

FLUX EFFECT BY MICROEXPLOSIVE EVAPORATION

Gero Zimmer, Rolling Hills Estates, Calif., assignor to Productech Inc., Rolling Hills Estates, Calif.

Filed Jul. 20, 1989, Ser. No. 382,849

Claims priority, application Fed. Rep. of Germany, Jul. 21, 1988, 3824861

Int. Cl.[5] B23K *1/20*

U.S. Cl. 228—205 **19 Claims**

1. A process for joining the surface of one member to the surface of another member at a joint, using heating to a joining temperature comprising:

applying a medium to the surface of at least one member at the joint, the medium evaporating by microexplosion at a temperature below the joining temperature and leaving substantially no solids, the medium being solid or liquid at ambient temperatures; and

heating the joint to the joining temperature to evaporate the medium by microexplosion for cleaning the surfaces and reducing surface tension thereat to form the joint.

4,986,464

FOLDABLE MEASURING DEVICE

Joanne K. Leigh, Wilmington, Del., assignor to E. I. du Pont de Nemours and Company, Wilmington, Del.

Filed Mar. 23, 1989, Ser. No. 327,948

Int. Cl.[5] G01F *19/00;* **B65D** *5/42*

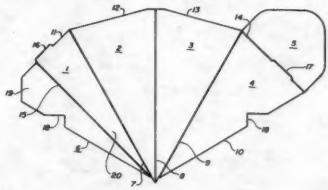
U.S. Cl. 229—116 **19 Claims**

1. A foldable device in both its folded and unfolded condition for measuring quantities of particulate materials when in its folded condition comprising:

(i) a substantially flat member having first, second, third and fourth substantially triangular sections, each section having first, second and third edges, the first and second edges of each section being substantially the same length, the first section second edge being connected at a first crease along the second section first edge, the second section second edge being connected at a second crease along the third section first edge, the third section second edge being connected at a third crease along the fourth section first edge;

(ii) an optional tab connected to the first section third edge; and

(iii) an optional fifth section having an edge connected at a fourth crease along the fourth section third edge, the fourth crease having a slot for receiving the tab when the device is folded at the first, second and third creases,



the device having an inside and an outside, the inside being the side next to the particulates to be measured and the outside forming the outer surface of the device,

when folded for measuring, the device is substantially symmetrical about an axis with the first section being in contact with the fourth section,

wherein the inner surface of one or more of the first through fourth sections has visible graduations to indicate incremental quantities of the material held within the device when folded.

4,986,465

OPENING ARRANGEMENT ON A PACKING CONTAINER

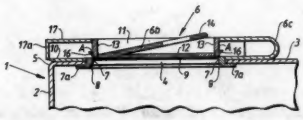
Kent Jacobsson, Södra Sandby, and Hans Carlsson, Nyköping, both of Sweden, assignors to Tetra Park Holdings & Finance S.A., Pully, Switzerland

Filed Nov. 9, 1989, Ser. No. 435,248

Claims priority, application Sweden, Nov. 9, 1988, 88040415

Int. Cl.[5] B65D *5/70*

U.S. Cl. 229—123.3 **13 Claims**



1. A reclosable opening arrangement for a packing container comprising:

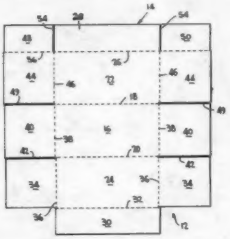
a container wall having an opening and an insert secured in said opening, said insert having a central portion of reduced thickness;

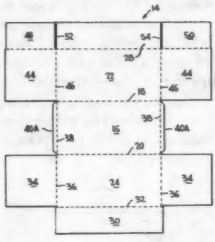
a flexible strip having first and second parts, said first part being secured to said container wall adjacent said opening and said second part being superimposed over said opening, a cap secured on said second part and having a base and a surrounding upright side wall, said centrally located portion of reduced thickness being secured to the base of the cap, and gripping means on said cap for pulling said cap away from said container wall to remove said central portion to expose a hole in said insert through which the contents of said container may be poured.

4,986,466
BOX AND BLANK FOR FORMING SAME

Donald S. Colby, Elk Grove, Ill., assignor to Continental Can Company, Inc., Norwalk, Conn.

Filed Feb. 12, 1988, Ser. No. 159,314
Int. Cl.[5] B65D 5/20
U.S. Cl. 229—193 3 Claims





1. A box formed from a one-piece blank, said box comprising a bottom wall having front and rear walls hingedly connected to said bottom wall along front and rear edges of said bottom wall, an end forming panel carried at opposite ends of each of said front and rear walls, and a transverse closure flap carried by each of said end forming panels carried by said front wall, each wall of said box being rectangular and each of said flaps and said walls being rectangular, a further panel being carried by each end of said bottom for cooperation with said end forming panels, each further panel being a full height end panel.

4,986,467
MAILBOX DELIVERY SIGNAL APPARATUS

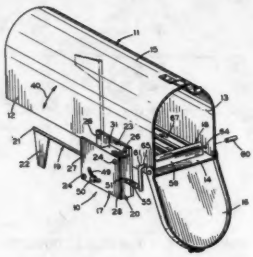
E. Bruce Bibbee, 2281 Baird Rd., Fostoria, Ohio 44830

Filed Dec. 5, 1989, Ser. No. 446,004
Int. Cl.[5] B65D 91/00
U.S. Cl. 232—34 16 Claims

1. A signal apparatus for use with a mailbox having a side wall comprising:

a signal assembly adapted to be attached to an outer surface of a sidewall of a mailbox and movable between a down position and an upright position including a housing adapted to be attached to the outer surface of the sidewall and a signal mast having one end rotatably mounted in said housing; and

a detection assembly adapted to be pivotally mounted in the mailbox for rotation when an object is placed on said detection assembly, said detection assembly being coupled to said signal assembly whereby said rotation of said detection assembly moves said signal assembly from the down position wherein said housing includes a hub and a wheel rotatably mounted on said hub, said one end of said

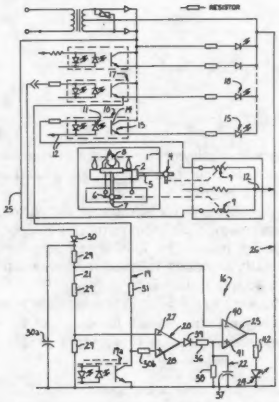


signal mast being attached to said wheel to the upright position.

4,986,468
TEST CIRCUIT FOR SYSTEM MONITORING APPARATUS

John J. Deisinger, Wauwatosa, Wis., assignor to A.O. Smith Corporation, Milwaukee, Wis.

Filed Aug. 29, 1989, Ser. No. 400,167
Int. Cl.[5] F23N 5/24
U.S. Cl. 236—21 R 10 Claims



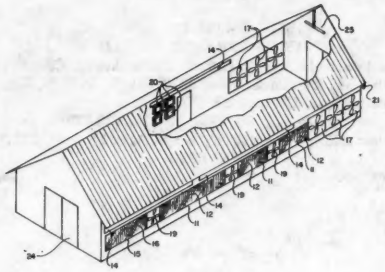
1. A monitoring apparatus including status monitoring of a gas-fired operating system including a gas fired burner having an electrically actuated pilot unit and a main burner unit ignited from said pilot unit, comprising a pilot sensor unit sensing turn-on of said pilot unit, a burner sensor unit sensing turn-on of the main burner unit, a first comparator unit having a reference input and having a second input connected to said pilot sensor and to said burner sensor unit and having an output, a timing unit connected to the output of the comparator, said pilot sensor unit being operable to establish an activation of said comparator and said burner sensor unit being operable to hold said comparator deactivated whereby said comparator establishes an output only in the absence of turn-on of the main burner and said timing unit times out only if the main burner does not turn-on within the period of said timing unit.

4,986,469

METHOD OF VENTILATING AN ANIMAL ENCLOSURE IN RESPONSE TO TEMPERATURE

James A. Sutton, Jr., 816 Henkel Rd., Statesville, N.C. 28677

Filed Jun. 26, 1990, Ser. No. 543,468
Int. Cl.[5] G05D 23/13
U.S. Cl. 236—49.3 25 Claims



1. A method of ventilating an animal enclosure through a wide range of temperature variations to maximize production efficiency and minimize physiological stress in animals, comprising the steps of:

(a) providing an animal enclosure having:

(ii) sidewall ventilation exhaust fans positioned in the sidewalls of the animal enclosure;

(iii) sidewall ventilation openings positioned in the sidewalls of the animal enclosure and including means for closing said sidewall ventilation openings against the passage of air therethrough;

(iv) tunnel ventilation exhaust fans positioned in one end of the animal enclosure; and

(v) tunnel ventilation openings proximate the other end of the animal enclosure and including means for closing said tunnel ventilation openings against the passage of air therethrough;

(vi) automatic means for sensing outside ambient temperature and controlling the operation of the sidewall ventilation exhaust fans and tunnel ventilation exhaust fans responsive to the sensed temperature:

(b) at and below a predetermined low outside ambient temperature, operating said sidewall ventilation exhaust fans to exhaust air drawn into the animal enclosure through said sidewall ventilation openings while said tunnel ventilation openings are closed and said tunnel ventilation fans are disabled to achieve a relatively low level of powered air movement through the animal enclosure to provide both minimum ventilation and high temperature control;

(c) between a predetermined middle range of outside ambient temperature, opening the sidewall ventilation openings while disabling both sidewall ventilation exhaust fans and tunnel ventilation exhaust fans to achieve natural cross-ventilation through the animal enclosure; and

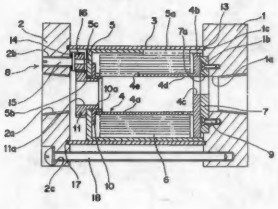
(d) at and above a predetermined high range of outside ambient temperature, closing the sidewall ventilation openings, disabling the sidewall ventilation exhaust fans, opening the tunnel ventilation openings and operating the tunnel ventilation exhaust fans to achieve a relatively high level of powered air movement through the animal enclosure.

4,986,470

FLOW CONTROLLER

Tsutomu Yamazaki, Kawanishi, Japan, assignor to Hanano Commercial Co., Ltd., Kobe, Japan

Continuation of Ser. No. 184,864, Apr. 22, 1988, abandoned.
This application Dec. 7, 1989, Ser. No. 449,397
Claims priority, application Japan, Apr. 24, 1987, 62-102300
Int. Cl.[5] G05D 23/00; F01P 7/02
U.S. Cl. 236—93 R 1 Claim



1. A flow controller of a temperature-sensitive type provided with an initial condition setting mechanism, comprising:

a valve;

a valve seat associated with said valve;

a bimetal support tube disposed around said valve;

a bimetal member wound in overlapping manner between said valve and said bimetal support tube, and having an end directly coupled to said valve and an opposing end directly coupled to said bimetal support tube; and

a liquid passage formed through said valve and connected to a space in which said bimetal is disposed,

wherein said valve comprises a closing portion at the downstream end thereof which has a passage port, and said valve seat comprises a port adapted to face toward said closing portion including said port, so that the relative position between said ports in the valve and said valve seat changes for automatic control of the liquid flow by virtue of the rotation of said valve caused by deformation of said bimetal member in accordance with the change of the liquid temperature, and wherein an initial flow corresponding to a predetermined temperature is set in accordance with an initial position of said valve, and

wherein said valve and said bimetal support tube are fixed between upstream and downstream covers, and an adjustment bolt to rotating said bimetal support tube is supported by said upstream cover and is fixed to a first gear which meshes with a second gear fixed to said bimetal support tube.

4,986,471

REMOTE INDICATOR LIGHT AND SAFETY SHIELD FOR ELECTROSTATIC SPRAY GUN

Gary L. Hethcoat, Ontario, Calif., assignor to General Dynamics Corp., Air Defense Systems Div., Pomona, Calif.

Filed Jul. 3, 1989, Ser. No. 375,422
Int. Cl.[5] B05B 5/025
U.S. Cl. 239—3 34 Claims

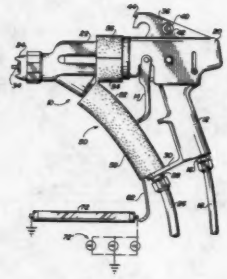
24. A method of providing a safety shield for use with an electrostatic spray paint gun having a barrel and a paint tube connected thereto for supplying paint from a paint hose to a nozzle mounted on the barrel, said method comprising:

securing a thin sheet of conductive foil to one side of a safety shield made of a T-shaped segment of nonconductive material, said segment being formed with extended arms and a base in the shape of the letter "T";

fitting the base of said T-shaped segment of nonconductive material around the paint tube of the spray gun, with said conductive foil on said one side of said safety shield facing the paint tube of the spray gun;

retaining the base of said T-shaped segment of nonconductive material in position around the paint tube of the spray gun;

fitting the arms of the T-shaped segment of nonconductive material around the barrel of the spray gun, with said conductive foil on said one side of said safety shield facing the barrel of the spray gun;



retaining the arms of the T-shaped segment of nonconductive material in position around the barrel of the spray gun; and

discharging an electrostatic charge from said conductive foil.

4,986,472

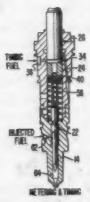
HIGH PRESSURE UNIT FUEL INJECTOR WITH TIMING CHAMBER PRESSURE CONTROL

Timothy A. Warlick, Columbus; Jeffrey L. Campbell, Hope; Lester L. Peters, Columbus; Michael E. Lucas, Columbus; Julius P. Perr, Columbus, and Kuang-Wen T. Wan, Columbus, all of Ind., assignors to Cummins Engine Company, Inc., Columbus, Ind.

Filed Sep. 5, 1989, Ser. No. 402,893

Int. Cl.[5] F02M *45/00, 53/04*

U.S. Cl. 239—88 **27 Claims**



27. A high pressure unit fuel injector for injecting fuel into the combustion chamber of an internal combustion engine comprising:

an injector housing having a central bore and an injection orifice located at the lower end of said injector housing and communicating between said central bore and the combustion chamber;

upper and lower plungers mounted for reciprocating movement within said central bore;

hydraulic timing means for varying the timing of the injection of metered fuel, said hydraulic timing means comprising a collapsible timing chamber formed between said upper and lower plungers;

valve means movable from a closed position to an open position to limit the pressure of timing fluid in said timing chamber during fuel injection by releasing timing fluid from said timing chamber;

first biasing means for biasing upwardly said lower plunger during metering of timing fluid into said timing chamber to establish a biasing force which limits the metering of timing fluid into said timing chamber and which tends to move said valve means toward its closed position; and

second biasing means for adding additional biasing force which tends to move said valve means toward its closed position without increasing the biasing force which resists metering of timing fluid into said timing chamber.

4,986,473

CROP SPRAYER SHIELD

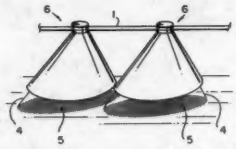
D. Gavin Semple, R.R. 2, Craven, Saskatchewan, Canada S0G 0W0 , and Donald J. Vass, 3322 Fourth Ave., N. Regina, Saskatchewan, Canada S4R 0V6

Filed Aug. 30, 1988, Ser. No. 238,129

Claims priority, application Canada, May 14, 1987, 537182

Int. Cl.[5] B05B *1/28*

U.S. Cl. 239—104 **3 Claims**



1. A spray shield for agricultural crop spraying equipment of the type including a spray boom for carrying liquid to be sprayed and a plurality of spaced apart nozzles for discharging liquid from the boom, the shield comprising hood means including a cylindrical neck for mounting on the boom in surrounding relationship to a nozzle, and a substantially elliptical body flaring downwardly and outwardly from said neck, said elliptical body having essentially the same shape as the spray pattern produced by the nozzle so as to maintain the integrity of the spray pattern from the nozzle and through the elliptical body, the height of the shield being such that the bottom end thereof is above the crop being sprayed during use of the shield, whereby the spray from the nozzle is protected from the wind while being at least partly visible to the spraying equipment operator.

4,986,474

STREAM PROPELLED ROTARY POP-UP SPRINKLER

Richard L. Schisler, and George L. Sesser, both of Walla Walla, Wash., assignors to Nelson Irrigation Corporation, Walla Walla, Wash.

Filed Aug. 7, 1989, Ser. No. 390,286

Int. Cl.[5] B05B *3/04*

U.S. Cl. 239—205 **29 Claims**

1. A pop-up, rotating stream sprinkler device comprising:

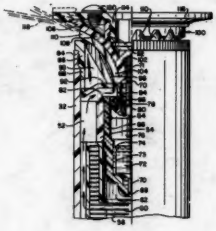
a first outer housing having a first longitudinal axis, and an inlet end adapted for connection to a source of liquid under pressure;

a second inner housing telescopically mounted within said first outer housing for movement between retracted and extended positions, and having a second longitudinal axis coincident with the first longitudinal axis, and an outlet end adapted to discharge to atmosphere a stream of said liquid under pressure;

a brake assembly including a brake assembly housing mounted in said second inner housing;

a shaft adjacent the outlet end of the second inner housing, one end of said shaft supporting a rotary distributor downstream of said outlet end, and the other end of said shaft

rotatably mounted in said brake assembly housing upstream of said outlet end; and means for isolating said shaft



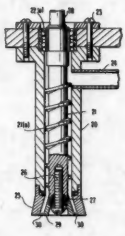
and substantially all of said brake assembly housing from said liquid under pressure at all points upstream of said outlet end.

4,986,475

METHOD AND APPARATUS FOR SPRAYING FLUIDS

Paul F. Spadafora, Lagrangeville, N.Y.; John M. Kaiser, Westwood, and James R. Davis, Boonton, both of N.J., assignors to Nabisco Brands, Inc., East Hanover, N.J.

Filed Feb. 19, 1988, Ser. No. 157,976
Int. Cl.[5] B05B *3/02*; B05C *5/00*
U.S. Cl. 239—218.5 **33 Claims**



1. A device for depositing a material onto a surface comprising:

(a) housing;

(b) means to introduce the material to be deposited into one end of said housing;

(c) rotatable means to assist in agitating said material to be deposited and moving said material to be deposited from one end of said housing to the other end of said housing;

(d) an opening in the sidewall on said other end of said housing adapted to direct the flow of material from said housing; and

(e) means on the end of said rotatable means adjacent to the other end of said housing for assisting the flow of said material through the opening in the sidewall of said housing.

4,986,476

CLEANING SPRAYERS WITH A SPRAYING-ANGLE ADJUSTING DEVICE

Tyh-Yuan Hour, 82, To-Syh Village, Luh-Jeau Shian, Chiayi Hsien, Taiwan

Filed Aug. 22, 1989, Ser. No. 396,661
Int. Cl.[5] B05B *3/02*
U.S. Cl. 239—227 **5 Claims**

1. A cleaning sprayer with a variable spraying-angle for cleaning water ejected therefrom comprising:

an enclosed base including (a) a sidewall means for enclosing a side thereof, in which said sidewall means a pair of threaded openings 180° opposite one another around said sidewall means are provided, and (b) a top in which an opening is provided;

a pair of threaded bolts, each said bolt being received in a respective said threaded opening and being directed so that an inner end thereof is adjustably spaced from and opposite an inner end of the other said bolt;

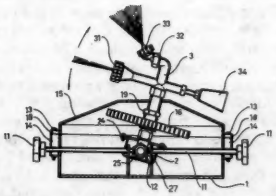
a water pipe connector provided in said sidewall means of said base which is displaced 90° around said sidewall means from said threaded openings;

a 90° elbow fitting in said base which is rotatably connected at an inlet end thereof defining a first axis to said water pipe connector and which includes an outlet end defining a second axis perpendicular to the first axis;

a motor means for rotating a drive gear;

a linking bar which is attached at one end to said motor means to mount said motor means thereto and which is mounted at another end to said 90° elbow fitting, said linking bar being laterally disposed between the inner ends of said bolts;

a guide having an outlet end and an inlet end, which said inlet end is rotatably connected to the outlet end of said 90° elbow fitting;



a gear wheel fixed about said guide pipe which engages said drive gear of said motor means so as to rotate said guide pipe about the second axis of said 90° elbow fitting;

a spraying means for spraying cleaning water, said spraying means extending through said opening in said top and including an inlet end which is secured to the outlet end of said guide pipe, two spray nozzles located outside of said base adjacent said opening of said top, and a mounting means for mounting one of said spray nozzles to said spraying means so that a spraying angle thereof is selectively adjustable;

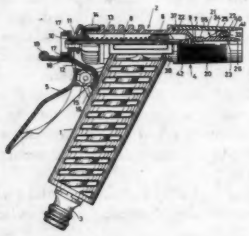
whereby, as water is fed through said water pipe connector and ultimately out of said spray nozzles, said motor means causes said gear and hence said spray nozzles mounted to said guide pipe to rotate about the second axis of said 90° elbow fitting extending through said guide pipe, and further whereby ejection of the water from the spray nozzles causes said guide pipe and hence said spray nozzles to be inclined about the first axis of the 90° elbow fitting along the opening in said top in a direction of a resultant jet of said spray nozzles which direction reverses every 180° of rotation about said second axis as the resultant jet action reverses and with the amount of inclination determined by a clearance provided between the inner ends of said bolts and said linking bar.

4,986,477

SPRAY GUN WITH ADJUSTMENT OF THE SHAPE OF THE JET

Gianfranco Roman, Pasiano, Italy, assignor to Claber S.p.A., Fiume Veneto, Italy

Continuation of Ser. No. 172,087, Mar. 23, 1988, abandoned. This application Aug. 8, 1989, Ser. No. 391,408
Claims priority, application Italy, Apr. 6, 1987, 21332/87[U]
Int. Cl.[5] B05B *1/04*
U.S. Cl. 239—455 **2 Claims**



1. A spray gun, comprising:
a liquid delivery pipe provided with a nozzle passed through by a circular axial hole along the delivery pipe;
a control rod axially movable in said delivery pipe for opening and closing said axial hole of the nozzle; and,
an adjustable diffusing member arranged downstream of said nozzle, said diffusing member including a pair of flexible, substantially flat shaped, parallel tangs integrally extending forwards form said nozzle in a cantilever fashion and a hollow sleeve rotatably arranged around said tangs, said tangs having lateral protrusions provided with forwardly-extending teeth and said sleeve being provided with spiral arc seats engaged by said pins such that rotation of said sleeve causes said tangs to move radially between a first position at which said tangs are spaced by a distance greater than a diameter of the axial hole of the nozzle, whereupon said axial hole is unobstructed for causing a liquid jet of circular shape, and a second position, in which said tangs are spaced at a distance less than the diameter of the axial hole, so as to obstruct said hole partially, causing the spray gun to emit a liquid jet of rectangular shape.

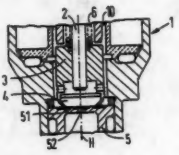
4,986,478

INJECTION VALVE

Paolo Bertini, Via Di Salviano, Italy, assignor to Siemens Aktiengesellschaft, Berlin and Munich, Fed. Rep. of Germany

PCT No. PCT/DE88/00396, § 371 Date Mar. 1, 1990, § 102(e) Date Mar. 1, 1990, PCT Pub. No. WO89/00244, PCT Pub. Date Jan. 12, 1989
PCT Filed Jun. 30, 1988, Ser. No. 466,255
Claims priority, application Fed. Rep. of Germany, Jul. 1, 1987, 8709111[U]
Int. Cl.[5] F02M *61/18, 51/08*
U.S. Cl. 239—585 **11 Claims**

1. An injection valve for injecting fuel into an intake line of an internal-combustion engine, comprising:
a valve body that has an annular valve seat at an inside of the injection valve, said valve body being concentric with a principle axis;
a closing part mounted for displacement along the principle axis, said closing part being flat;
a spring mounted to press said closing part against said valve seat;
an electromagnet mounted to lift said closing part of said valve seat;
a cylindrical conduit that penetrates said valve body inside said valve seat from inside to outside, said conduit being cylindrical and of constant diameter;
through which said conduit discharges to outside said valve body, said nozzle opening being formed by a central opening, and
peripheral openings that surround said central opening and expand toward the outside,
guide tabs separating said peripheral openings from one another;



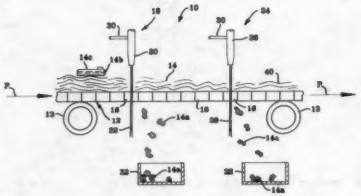
said peripheral openings and said guide tabs lying in an annular zone that is arranged between said central opening and an end of said conduit and that describes an acute angle of inclination of less than 90° with the principle axis.

4,986,479

FLUID JET SHREDDER APPARATUS AND METHOD OF USE

Michael C. Swarden, Cambridge; Henry B. Faulkner, Dover; Walter L. Brassert, Belmont, all of Mass., and James E. Stoudt, Stamford, Conn., assignors to Ingersoll-Rand Company, Woodcliff Lake, N.J.

Filed Aug. 14, 1989, Ser. No. 393,898
Int. Cl.[5] B02C *19/06*
U.S. Cl. 241—15 **14 Claims**



1. A method for shredding, comprising the steps of:
conveying a stream of material along a path through a shredding station;
carrying the stream of material on a substantially horizontally movable member having openings therein;
directing a high pressure fluid jet on the stream of material in a direction crossing the path, whereupon portions of the material are shredded;
collecting the shredded portions of the material at a location outside the path; and
receiving the shredded portions of the material that fall through the openings.

4,986,480

METHOD AND APPARATUS FOR FEEDING A CONICAL REFINER

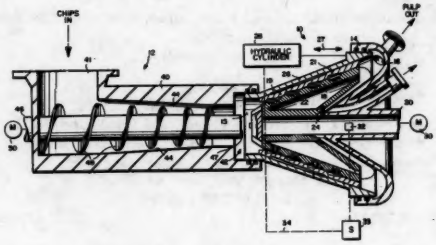
Johan Gullichsen, Sjundea, Finland; Bengt Nilsson, and Ronny Hoglund, both of Skoghall, Sweden, assignors to Kamyr AB, Karlstad, Sweden

Filed Jun. 29, 1989, Ser. No. 373,065
Int. Cl.[5] B02C *19/12*
U.S. Cl. 241—28 **17 Claims**

1. Apparatus for producing pulp from cellulosic fibrous material comprising:

(a) a mechanical refiner having at least two relatively movable refining elements, and a rotor shaft connected to one of said elements, a material inlet, and a pulp outlet, and a given transporting capacity; and

(b) means for force feeding said refiner inlet with material at a rate greater than the transporting capacity of said refiner, and forming a plug of material at the refiner inlet which substantially prevents passage of steam therethrough, said force feeding means comprising a progressive compacting plug screw having a blank portion on the screw at the most narrow portion of the surrounding housing, immediately adjacent the refiner.

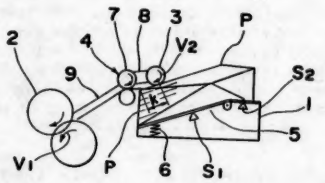


4,986,481

AUTOMATIC PAPER FEEDER FOR DOCUMENT SHREDDER

Yoshiharu Fujii, Sakurai; Hiroshi Fujita, and Yukitoshi Fujita, both of Yamatokoriyama, all of Japan, assignors to Sharp Kabushiki Kaisha, Osaka, Japan

Continuation of Ser. No. 166,054, Mar. 9, 1988, Pat. No. 4,890,797. This application Jun. 22, 1989, Ser. No. 369,944
Claims priority, application Japan, Mar. 9, 1987, 62-54965
The portion of the term of this patent subsequent to Jan. 2, 2007, has been disclaimed.
Int. Cl.[5] B02C *25/00*
U.S. Cl. 241—30 13 Claims



1. A feeder and document shredder comprising:

a feeding table for receiving thereon a stack of sheets to be shredded;

a feeding roller for feeding the sheets from the feeding table;

a set of shredding blades which rotate at a rotational peripheral speed, said shredding blades receive the sheets fed by the feeding roller and said shredding blades shred said sheets;

a driving device for driving said feeding roller for rotation at a rotational peripheral speed, said rotational speed of said feeding roller being faster than the rotational speed of said shredding blades whereby jamming of said set of shredding blades is avoided; and

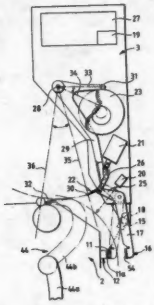
means provided between the set of shredding blades and the feeding roller for accommodating bowing of the sheets as the sheets are shred by the shredding blades.

4,986,482

YARN JOINING CONTROL DEVICE IN AN AUTOMATIC WINDER

Tomoaki Okayama, Joyo, Japan, assignor to Murata Kikai Kabushiki Kaisha, Kyoto, Japan

Filed Oct. 3, 1989, Ser. No. 416,666
Claims priority, application Japan, Oct. 7, 1988, 63-251933
Int. Cl.[5] B65H *54/26*
U.S. Cl. 242—35.6 OR 11 Claims



1. In an automatic winder of the type having yarn joining-disablement display means which displays a failure of yarn joining operation in case where such yarn joining operation fails a predetermined number of times and in which a carriage moves along a plurality of winding units, a yarn joining control device characterized in that said carriage is provided with:

first detection means for detecting the display state of the joining-disablement display means to stop the carriage;

means for converting said joining-disablement display means to a non-display state in accordance with the detection of said first detection means;

second detection means for detecting said joining-disablement display means returned to a display state as a result of the failure of a predetermined number of times of yarn joining operation effected after converting said joining-disablement display means to a non-display state; and

memory means for storing the joining-disablement state by detection of said second detection means to impede said converting of said joining-disablement display to a non-display state when said carriage again arrives at the winding unit.

4,986,483

WINDER OF SYNTHETIC YARN, CHEESE-LIKE YARN PACKAGE OF SYNTHETIC YARN, AND METHOD FOR WINDING THE SAME

Ushio Ryu; Hideo Ono; Kengi Kabashima; Yutaka Masushige; Teruhiko Matsuo, and Tadashi Koyanagi, all of Nobeoka, Japan, assignors to Asahi Kasei Kogyo Kabushiki Kaisha, Japan

Continuation of Ser. No. 308,947, Feb. 8, 1989, abandoned, which is a continuation of Ser. No. 32,714, Apr. 1, 1987, abandoned. This application Dec. 18, 1989, Ser. No. 449,058
Claims priority, application Japan, Apr. 9, 1986, 61-800622; Apr. 10, 1986, 61-81204; Apr. 14, 1986, 61-84088; Apr. 14, 1986, 61-84086
Int. Cl.[5] B65H *59/00, 54/00, 54/38, 55/00*
U.S. Cl. 242—45 12 Claims

1. A winder for winding a synthetic yarn at a constant speed, comprised of:

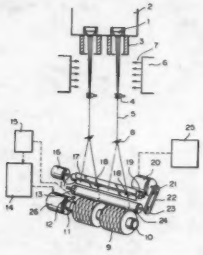
a bobbin shaft having a bobbin mounted thereon for winding a synthetic yarn;

bobbin shaft driving means, operably connected to a first inverter, for rotating said bobbin shaft;

a traverse device for traversing a yarn supplied to said bobbin;

a contacting roll arranged in a direction parallel to an axis of said bobbin shaft such that said contacting roll is movable into contact with a circumferential face of a yarn package wound on said bobbin;

contacting roll driving means, operably connected to a second inverter independent of said first inverter, for rotating said contacting roll;



rotational speed detecting means for detecting a rotational speed of said contacting roll; and

controller means, connected electrically with said bobbin shaft driving means and said rotational speed detecting means, for controlling a rotational speed of said bobbin shaft through said bobbin shaft driving means in accordance with said detected rotational speed of said contacting roll; and

said second independent inverter not being connected to said controller means.

4,986,484

METHOD TO STORE FILIFORM PRODUCTS AND RELATIVE DEVICE TO STORE FILIFORM PRODUCTS

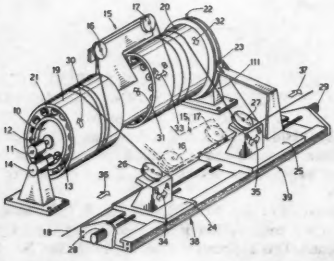
Enzo Coccolo, Gorizia, Italy, assignor to Casagrande SpA, Fontanafredda, Italy

Filed Nov. 3, 1989, Ser. No. 431,098

Claims priority, application Italy, Nov. 16, 1988, 83518 A/88

Int. Cl.[5] B65H *51/20*

U.S. Cl. 242—47.01 **11 Claims**



1. A device for temporarily storing a filiform element received in transient from an upstream supply thereof for transmittal to a downstream processing unit, comprising:

a frame;

a first idler storage drum carried by said frame for rotation about an axis and for receiving the element;

a second idler storage drum carried by said frame at a location axially spaced from said first drum for rotation about said axis and for discharging the element;

a receipt and delivery station carried by said frame between said drums and mounted for rotation about said axis, said receipt and delivery station having at least one roller for transferring the element from said first drum to said second drum;

first and second switch stations for transmitting the element from the supply to the first drum and from the discharge drum to the downstream processing unit, respectively; and

means for displacing said second drum in an axial direction relative to said first drum.

4,986,485

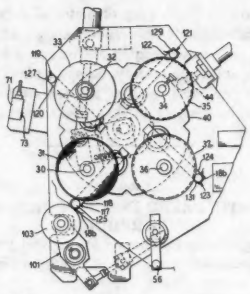
AUTOMATIC FOIL CHANGE UNIT

Pierre Soubrier, Villecresnes, France, and Frank Bochtler, Rudersberg-Schlechtbach, Fed. Rep. of Germany, assignors to Baxter International Inc., Deerfield, Ill.

Filed May 26, 1989, Ser. No. 358,975

Int. Cl.[5] B65H *19/18*

U.S. Cl. 242—58.3 **22 Claims**



1. An apparatus for supplying a web of material comprising:

a plurality of rolls of material located on a rotatable member;

means for feeding an end of a web of material from a first roll of material form the rotatable member to a second position; and

means for splicing an end of a web of material located on the first roll of material to an end of a web of material located on a second roll of material, the means for splicing including a load arm coupled to the rotatable member and a movable interference roller, the load arm cooperating with the interference roller to pinch two ends of two separate webs of material between the load arm and interference roller when the rotatable member is rotated.

4,986,486

SPOOL WITH CLIP FOR ATTACHING A WEB TO THE SPOOL

David B. Kemp, Fairport, N.Y., assignor to Eastman Kodak Company, Rochester, N.Y.

Filed Nov. 2, 1989, Ser. No. 430,541

Int. Cl.[5] B65H *75/28*; G03B *1/04*

U.S. Cl. 242—74.100 **5 Claims**

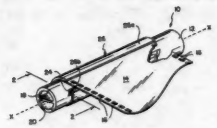
1. In a spool for a strip of web material, such as a strip of photographic film, the spool having an elongate core with an outer surface on which the web material is to be wound, the improvement comprising:

a first elongate slot, extending through said outer surface and in an axial direction, for receiving an end portion of the web material;

a second elongate slot, extending through said outer surface and in an axial direction, said second slot being spaced from said first slot about the circumference of said outer surface; and

flexible clip means comprising a substantial semi-cylindrical

portion having a flange portion projecting in a generally radially inward direction from an axially extending edge of said semi-cylindrical portion, said flange portion being positionable in said second slot after an end portion of the web material has been inserted into said first slot, and said semi-cylindrical portion of said clip means being engageable with said outer surface between said slots and with part of the web material adjacent said first slot to hold such part of the web material against said outer surface,



for securing the end portion of the web material against movement beneath said semi-cylindrical portion of said clip means during rotation of said spool in either direction and for attaching the end portion of the web material to said core with the web material extending tangentially from said outer surface,

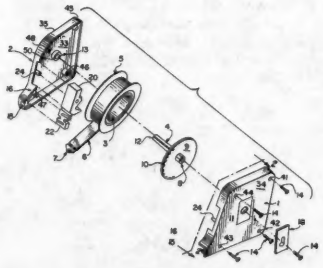
whereby said spool may be rotated in the direction from said first slot toward said second slot to wind the web material onto said spool or in the opposite direction to thrust the web material from said spool.

4,986,487

APPARATUS FOR DISPENSING AND RETRACTING TAPE

Mark A. Irvin, 8401 Falcon Cir., Angier, N.C. 27501

Filed Apr. 7, 1989, Ser. No. 334,543
Int. Cl.[5] B65H *75/48*
U.S. Cl. 242—107.5 **7 Claims**



1. A device for dispensing and retracting tape comprising:

a housing having a first half and a second half, each half having an inner wall and an outer wall, the inner wall of said first half having an aperture formed therethrough and a ratchet member disposed about said aperture, said housing including an opening through which tape can be dispensed or retracted;

a ratcheted spindle assembly including a disc having a first side facing said first housing half and a second side facing said second housing half, a spindle having a first end extending from said second side and a second end journaled in said second housing half, a stud extending from said first side and a ratchet member arranged in the peripheral region of said first side, said stud having a portion extending through said aperture in said first housing half such that said ratchet member on said first half member engages the ratchet member on said disc;

a spool rotatably supported in said housing for supporting said tape;

a coiled spring retained in said spool, said spring having a first portion coupled to said spindle and another portion coupled to said spool; and

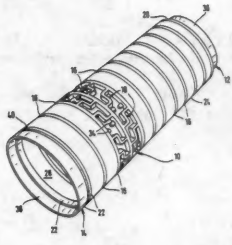
means releasably mounted on the outer wall of said first member and over said stud for covering and preventing rotation of said stud.

4,986,488

COMPRESSIBLE CHEESE CENTER FOR DYEING PURPOSES

Ralf Windhösel, Sonnenbühl/Württ, and Michael H. Wendler, Reutlingen/Württ, both of Fed. Rep. of Germany, assignors to Emil Adolff Plastic GmbH, Fed. Rep. of Germany

Filed Dec. 27, 1989, Ser. No. 457,505
Claims priority, application Fed. Rep. of Germany, Dec. 27, 1988, 3844006
Int. Cl.[5] B65H *75/20, 75/24*
U.S. Cl. 242—118.1 **21 Claims**



1. A cylindrical, axially compressible cheese center for dyeing textile material on the center, comprising:

first and second end rings;

a plurality of stiffening rings arranged in axial succession between said first and second end rings;

each of said stiffening rings being firmly connected to an adjacent stiffening ring, with one of said stiffening rings being firmly connected to one of each of said first and second end rings, so that each of said stiffening rings is adjacent another ring;

said connections being made by a plurality of springy ring connecting webs arranged in a plurality of circumferential rows between said stiffening rings and said end rings;

said webs being bent at right angles and connected to said rings at right angles; and

a plurality of pairs of cooperating spacer lugs formed on adjacent rings and situated in each case between two ring connecting webs which are adjacent to one another in the circumferential row between said rings; wherein

said two spacer lugs of each pair of cooperating spacer lugs contact each other in the axial direction when said cheese center is axially compressed.

4,986,489

THREAD BRAKING MECHANISM WITH CATCHMENT DEVICE

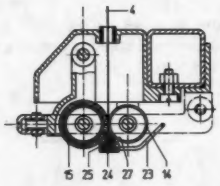
Manfred Bollen, Oberuzwil, Switzerland, assignor to Benninger AG, Uzwil, Switzerland

Filed Aug. 10, 1989, Ser. No. 392,267

Claims priority, application Switzerland, Aug. 10, 1988, 3020/88

Int. Cl.[5] B65H *59/16, 59/22*

U.S. Cl. 242—151 7 Claims



1. A device for braking threads or thread-like products, particularly for warping machines, comprising:

a pair of rotatably journalled rollers which can be pressed against one another to form a contact zone therebetween for receiving a moving thread or thread-like product; and

a catchment device located downstream of the roller pair in the direction of thread travel, said catchment device being in a plane generally parallel to the axes of the roller pair for restraining the further travel of the thread past the catchment device and for retaining the thread without tensile stress in the event of a thread break.

4,986,490

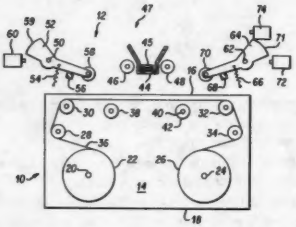
FILM SUPPLY AND THREADING MECHANISM

Michael N. Tranquilla, Livonia, Mich., assignor to Unisys Corp., Detroit, Mich.

Filed Jan. 19, 1989, Ser. No. 298,704

Int. Cl.[5] G03B *1/04, 1/18, 1/56*

U.S. Cl. 242—179 13 Claims



1. A film loading and control system adapted to be mounted in a camera having an image plane comprising:

a support means adapted to be mounted in the camera;

a film supply carrier means disposed on said support means;

a film take-up carrier means disposed on said support means;

a plurality of film guide rollers disposed on said support means defining a first film path between said film supply carrier means and said film take-up carrier means before said support means is mounted in the camera;

a film advance roller disposed on said support means for moving film between said supply carrier means and said take-up carrier means across the camera image plane;

a film tension means disposed in the camera;

a control means adapted to cooperate with said film tension means to operate said film supply carrier means and said film take-up carrier means, and

means defining a second film path between said film supply carrier means and said film take-up carrier means when said support means is located in operative position in the camera.

4,986,491

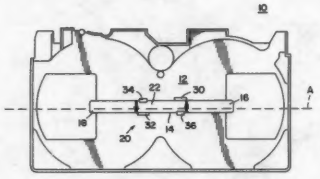
REEL LEAF SPRING/CASSETTE COVER COMBINATIONS AND METHODS FOR ASSEMBLY

Anthony L. Gelardi, Porpoise; Craig Lovecky, Old Orchard Beach, both of Me.; Alan Lowry, Canton, Mass., and Robert Barstow, Alfred, Me., assignors to Shape, Inc., Biddeford, Me.

Filed Dec. 28, 1989, Ser. No. 458,428

Int. Cl.[5] B65D *85/575;* F16F *1/18;* G11B *15/32*

U.S. Cl. 242—199 2 Claims



1. A tape cassette reel leaf spring/cover combination, comprising:

(a) a cassette cover including an area for receiving a reel leaf spring;

(b) an elongated reel leaf spring, including two sides;

(c) a plurality of projections formed on the cassette cover; and

(d) means for removably mounting the reel leaf spring relative to the area of the cassette cover,

wherein the plurality of projections includes:

a pair of diagonally opposed ramps and an opposing pair of walls, and

wherein the removably mounting means includes:

a receptacle formed on each wall for receiving the sides of the leaf spring.

4,986,492

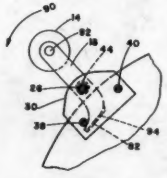
BIG GAME REEL AUXILIARY BRAKE

Lee Wulff, Beaverkill Rd., Lew Beach, N.Y. 12573

Filed Jun. 19, 1989, Ser. No. 368,255

Int. Cl.[5] A01K *89/033*

U.S. Cl. 242—294 22 Claims



1. In a big game spool fishing reel of the type comprising a reel body and a reel spool having two cylindrical outer rims and mounted in said reel body, the improvement comprising a rim acting reel brake comprising:

(a) a handle;

(b) two lever arms, each with two ends, said lever arms comprising:

(i) means engaging said handle at one end of each lever arm;

(ii) reel spool outer rim engaging means on the other end of each of said lever arms; and

(iii) arm pivot means on each arm positioned between said means to engage said handle and said reel spool outer rim engaging means and positioned closer to said reel spool outer rim engaging means than said means to engage said handle; and

(c) two lever arm stanchions rigidly affixed to said fishing reel body and each lever arm stanchion having a stanchion pivot means engaging one of said lever arms at the lever arm pivot means, wherein said lever arm stanchions are rigidly affixed to said reel body at a position where said reel spool outer rim engaging means on said lever arms may be brought into contact with said two spool cylindrical outer rims in response to the application of force to said handles.

4,986,493

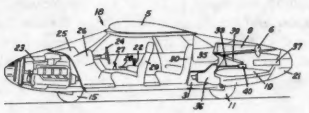
CONVERTIBLE FIXED WING AIRCRAFT

Branko Sarh, 2597 Devonshire Rd., Riverside, Calif. 92506

Division of Ser. No. 141,096, Jan. 5, 1988, Pat. No. 4,881,700. This application Dec. 5, 1988, Ser. No. 279,778

Int. Cl.[5] B64D *37/00*

U.S. Cl. 244—2 **8 Claims**



1. A convertible fixed wing aircraft comprising, in combination:

a fuselage of generally rectangular planform having a pair of steerable front wheels, and a pair of rear wheels, said steerable front wheels being movable angularly between a straight-ahead position and fully turned positions to either side of the straight-ahead position;

a wing mounted on said fuselage and movable between a laterally extended flight configuration and a retracted automotive configuration;

ailerons swingably connected to said wing at the trailing edge thereof for movement between a maximum upwardly angled position and a maximum downwardly angled position;

horizontal and vertical stabilizer means at the rear end of said fuselage;

a propeller;

an engine and transmission means connecting the engine alternatively to either said propeller or to one of said pairs of wheels; and

a control wheel permanently connected to both said front wheels and to said ailerons for actuating the same; said control wheel being operable, when turned approximately 90° in either direction, to cause said ailerons to move to their respective maximum angled positions while said front wheels are turned approximately 4°–6°, and when said control wheel is turned beyond approximately 90°, said front wheels may continue to be turned to their fully turned positions while the ailerons remain in said maximum angled position.

4,986,494

PROCESS OF STABILIZING AT ALTITUDE A STRATOSHPERIC BALLOON, AND BALLOON ADAPTED FOR CARRYING OUT THE PROCESS

Christian Tockert, Toulouse, France, assignor to Centre National D'Etudes Spatiales (C.N.E.S.), Paris, France

Filed Nov. 29, 1989, Ser. No. 443,670

Claims priority, application France, Nov. 30, 1988, 88 15798

Int. Cl.[5] G64B *01/58*

U.S. Cl. 244—96 **13 Claims**

1. A process for stabilizing at altitude a stratospheric balloon between upper and lower levels during the course of a plurality of diurnal and nocturnal cycles, comprising:

providing a stratospheric balloon of an open, variable volume type, having a transparent envelope (1) able to achieve both a full state in which said envelope is entirely inflated and reduced states of inflation in which said envelope has the shape of an upper bulb with a lower train extending therefrom,

providing on the upper part of the balloon a thermal trapping hood (7) having reflecting properties on the side surface:

greater than 1% of the total surface area of the balloon in the full state, so as to cover a significant portion of the bulb in a state of reduced inflation and limiting in this state the loss of energy by retransmission to the exterior, and

less than about 15% of the total surface area of the balloon in the full state in such a manner as to only slightly modify the thermal balance of the balloon in this state, and to leave uncovered the lower part of the bulb in a reduced state of fullness,

introducing a lighter than air gas into the balloon and launching the balloon by a conventional stratospheric balloon launching process.

4,986,495

COOLING STRUCTURE

David K. Stromath, Redondo Beach, and Curtiss D. Wiler, Palos Verdes, both of Calif., assignors to Rockwell International Corporation, El Segundo, Calif.

Filed Jun. 15, 1988, Ser. No. 207,072

Int. Cl.[5] B64G *1/58;* B64C *1/40*

U.S. Cl. 244—117 A **8 Claims**

1. An aerospace vehicle comprising,

a fuel tank containing a cryogenic liquid fuel,

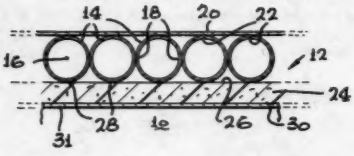
an external surface forming the skin of said vehicle,

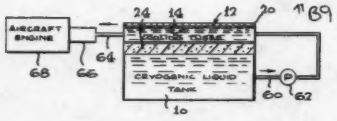
a primary load bearing structure disposed between said fuel tank and the external surface of said vehicle,

said load bearing structure consisting of a panel structure formed of a plurality of rigid metal tubes of substantially cylindrical shape connected together in side-by-side relation at the contacting peripheral surfaces of adjacent tubes, said tubes extending lengthwise in said panel struc-

ture, the axis of each of said tubes being in a common plane,

whereby cryogenic liquid fuel passing from said fuel tank and through said tubes during flight functions as a coolant for said external surface, and when said vehicle is on the





ground, said tubes are constructed to be evacuated and said evacuated tubes providing insulation for said tank, to prevent formation of frost and liquid air on the outside of the tank and on the external surface of said vehicle, and to prevent heat transfer into the tank.

4,986,496

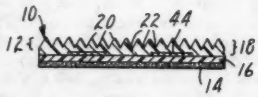
DRAG REDUCTION ARTICLE

Francis J. Marentic, Lake Elmo, and Terry L. Morris, St. Paul, both of Minn., assignors to Minnesota Mining and Manufacturing, St. Paul, Minn.

Filed May 31, 1985, Ser. No. 740,239

Int. Cl.[5] B64C *21/10*; B32B *3/00, 7/12*

U.S. Cl. 244—130 **17 Claims**



1. An article capable of reducing the resistance to drag of a fluid flowing thereover, said article comprising a thermoset polymeric sheet formed in situ from the reaction product of an isocyanate with a polyol, said sheet having a first surface contacting said fluid, said first surface comprising a series of parallel peaks separated from one another by a series of parallel valleys.

4,986,497

AIRCRAFT-DE-ICING SYSTEM

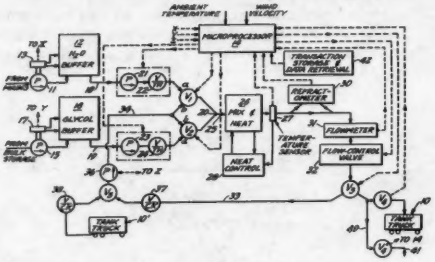
Kenneth A. Susko, Elmont, N.Y., assignor to COM-PRO Systems, Inc., Elmont, N.Y.

Filed Jun. 16, 1989, Ser. No. 367,424

Int. Cl.[5] B64D *15/10*

U.S. Cl. 244—134 C **19 Claims**

1. A demand-operated station having computer means for control of the preparation and delivery of liquid mixture for aircraft de-icing use, comprising liquid-mixing means connected to a mixture-output line; a glycol-supply line including computer-controlled first supply means for delivering a controlled flow of glycol to said mixing means, and a water-supply line including computer-controlled second supply means for delivering a controlled flow of water to said mixing means; said mixing means including a heat exchanger having means for adding heat to a mixed flow of glycol and water, and temperature-sensing means downstream from the heat exchanger for providing feedback control of the heat exchanger for regulating heated mixed-liquid flow to a predetermined elevated temperature; a refractometer connected for continuous response to index of refraction of heated-liquid flow in the mixture-output line, said refractometer producing an electric-signal output to said computer means for computer set-point control of mixing proportions via said first and second supply means; delivery-control means including a flowmeter and a flow-control valve in said mixture-output line, the flowmeter



producing an electric-signal output to said flow-control valve via said computer means, computer-controlled valve means operative in one position to deliver flow in said mixture-output line to an output-delivery line and in another position to recirculate flow in said mixture-output line to said mixing means, said temperature-sensing means producing an electric-signal output to said computer means, and said computer means being programmed to normally maintain said valve means in said other position and to operate said valve means to said one position only in the event that both (i) sensed mixed-flow temperature and (ii) refractive index have achieved predetermined values.

4,986,498

DEVICE FOR DETERMINING THE CONDITION OF RAILWAY SWITCHES OR RAILWAY CROSSINGS

Franz Rotter; Wolfgang Nayer, both of Zeltweg; Heribert Quantschnigg, and Erich Sattler, both of Weiskirchen, all of Austria, assignors to Voest-Alpine Maschinenbau Gesellschaft m.b.H., Linz, Austria

Filed May 24, 1989, Ser. No. 356,303

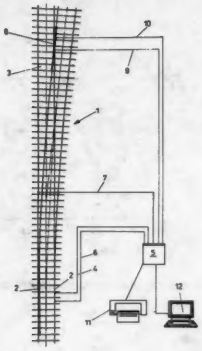
Claims priority, application Austria, May 27, 1988, 1395/88; Nov. 3, 1988, 2708/88

Int. Cl.[5] E01B *7/20*; B61L *23/04*

U.S. Cl. 246—458 **22 Claims**

1. A device for determining the condition of railway switches or railway crossings comprising at least one sensor for monitoring end positions of tongue rails for diagnosing wear

thereof and for establishing maintenance intervals, wherein said sensor is arranged within an area of a theoretical frog point



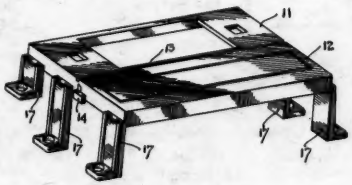
for determining deviations of railway wheel motion in at least one of a lateral and a height direction.

4,986,499

RADIO INSTALLATION KIT WITH CONVERTIBLE FRONT PANEL

Robert J. Ponticelli, 20274 Delita Dr., Woodland Hills, Calif. 91364

Filed Sep. 5, 1989, Ser. No. 403,112
Int. Cl.[5] G12B *9/00*
U.S. Cl. 248—27.1 **1 Claim**



1. A radio installation kit comprising:
a front panel having a pair of panel sections joined to each other along a breakaway seam, and
a pair of breakaway tabs interconnecting said panel sections at the opposite ends thereof for providing a rigid firm joinder therebetween,
whereby said front panel with said pair of panel sections therein is adapted for use in a first installation, and with said tabs being broken off and said panel sections separated from each other along said breakaway seam one of said panel sections is adapted for use in a second installation.

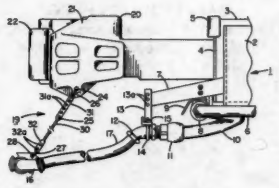
4,986,500

ADJUSTABLE AIR BRAKE HOSE SUPPORT FOR RAILWAY VEHICLES

Ernest J. Campbell, Akworth, Ga., assignor to American Standard Inc., Atlanta, Ga.

Filed May 22, 1989, Ser. No. 354,942
Int. Cl.[5] F16L *3/00*
U.S. Cl. 248—53 **20 Claims**

1. An adjustable support arrangement for suspending a flexible air brake hose assembly from a coupler of a railway vehicle comprising, an elasticized cord having a plurality of elongated openings formed in the respective ends, a spring wire clip connector passed through a selected one of said plurality of elongated openings formed in each respective end, one of said spring wire clip connectors releasably attached to an eyelet lug on the coupler, and the other of said spring wire clip connectors releasably attached to an eyelet lug on a glad-hand, so that the air brake hose assembly is supported at a predetermined height above the top of a track rail, each of said spring wire clip connectors is substantially identical and includes a hook portion formed on one end and a loop portion means formed



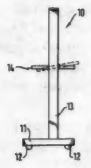
on the other end, a shank portion leading from said hook portion and extending to a first elongated leg portion which is perpendicular to said shank portion, said first leg portion leading to a bight portion which communicates with a second elongated leg portion which joins said loop portion means for operating as a thumb tab for being depressed during latching and unlatching of said hook portion with an intermediate portion of said second elongated leg portion and said loop portion means for operating as a safety lock with said hook portion when said spring wire clip connector is excessively deformed.

4,986,501

EQUIPMENT CARRIER

Peter Simon, Munich, Fed. Rep. of Germany, assignor to KNURR-Mechanik fur die Elektronik Aktiengesellschaft, Munich, Fed. Rep. of Germany

Filed Mar. 10, 1989, Ser. No. 321,862
Claims priority, application Fed. Rep. of Germany, Mar. 11, 1988, 3808223
Int. Cl.[5] G09G *1/00*; A47B *91/00*
U.S. Cl. 248—122 **16 Claims**



1. An equipment carrier comprising: a tilt-adjustable mounting plate lockable at different tilt angles; a base frame; two vertical columns connected to the base frame; two oscillating arms for positioning the mounting plate between the columns, the oscillating arms being articulated to the columns by horizontal oriented bolts and the mounting plate being lockable at different tilt angles with respect to the columns; said carrier further including joints permitting vertical adjustment of the oscillating arms on the columns, the joints comprising the horizontally oriented bolts which provide a pendulum axis, each column further including a vertically oriented fastening groove for receiving the bolts therein, the bolts being attachable to the columns in the grooves to fix the arms vertically with respect to the columns and detachable to permit move-

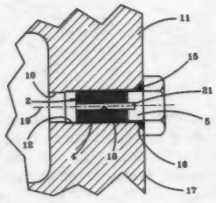
ment of the arms in a longitudinally displaceable manner along the fastening grooves; the mounting plate being provided with a first crossbar that is deflectable in a line parallel to the pendulum axis; said carrier further including a perforated plate having holes for engagement with the first crossbar to provide for continuous tilt adjustment; the center of gravity of the equipment carrier being below the bolts such that the carrier cannot assume a critical unstable position.

4,986,502

SAFETY DRAIN PLUG

Clarence J. Ceroke, 4716 Magnolia Ave., Canton, Ohio 44705

Filed Dec. 4, 1989, Ser. No. 445,442
Int. Cl.[5] F16R *31/50, 51/00*
U.S. Cl. 251—216 **5 Claims**



1. In combination, a safety drain plug for threaded removable engagement within an internally threaded cylindrical opening of a pressurized member, said plug including a cylindrical shank having a head provided with tool engaging flat side surfaces at one end, and an externally threaded cylindrical portion spaced from the head by a smooth unthreaded portion; an annular elastomeric sealing ring located about the smooth unthreaded portion of the shank for sealing engagement within an annular countersink surrounding the threaded opening of the pressurized member when the plug is fully threadably engaged in the threaded opening; and a single external groove formed in and extending generally axially along the majority of the shank and terminating in an outlet end located generally adjacent to the head and sealing ring and between said sealing ring and the majority of the threaded portion so that when the plug is partially unscrewed from the threaded opening of the pressurized member while a portion of the outlet end of the groove a portion of the shank and a portion of the sealing ring yet remain within the annular countersink to start venting pressure from within the pressurized member while a major portion of the threaded portion remains engaged with the internally threaded opening to prevent premature ejection of the plug from the threaded opening by any residual pressure in the pressurized member before complete removal of the plug from the pressurized member.

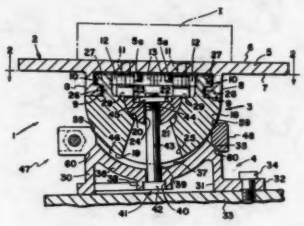
4,986,503

MOUNTING DEVICE

Thomas W. Kabat, 7856 Reinbold Rd., Reese, Mich. 48757

Filed Nov. 25, 1988, Ser. No. 276,342
Int. Cl.[5] F16M *11/14*
U.S. Cl. 248—181 **27 Claims**

1. An article mounting device comprising an attachment member adapted for connection to said article; a support member; interlocking coupling means separably and slideably joining said attachment member and said support member; releasable latch means reacting between said members and releasably maintaining said members in assembled relation relative to one another, said latch means comprising a pair of levers pivoted at corresponding ends to one of said members for movements toward and away from latching engagement with the other of



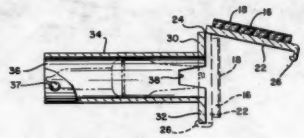
said members; and means biasing said levers toward said latching engagement.

4,986,504

DECORATIVE LIGHT PEDESTAL WITH HINGED CLOSURE

Lonnie F. Gary, Lubbock, Tex., assignor to Gary Products Group, Inc., Lubbock, Tex.

Continuation-in-part of Ser. No. 294,268, Jan. 6, 1989, Pat. No. 4,877,209. This application Nov. 2, 1989, Ser. No. 430,804
The portion of the term of this patent subsequent to Oct. 31, 2006, has been disclaimed.
Int. Cl.[5] A47F *5/00*
U.S. Cl. 248—205.3 **7 Claims**



1. A decorative light pedestal adapted to receive and maintain at least the socket portion of a decorative bulb and socket assembly, said pedestal comprising a base member having spaced apart sections which cooperate to define a substantially planar surface;

a circumferential socket support member extending outwardly from said base member on the side of said base member that is opposite said substantially planar surface;

a first void extending axially through the circumferential support member and the plane of the base member to permit said socket assembly to be inserted into the circumferential support member through said base member, and a second void adapted to receive and accommodate the passage of wiring connected to said socket assembly through said circumferential support member after said socket assembly is inserted therein; and

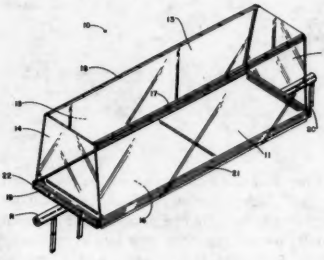
a cover member joined by a hinge to said base member that is substantially coextensive with the outer perimeter of said base member and releasably engageable with said base member to maintain said decorative socket assembly inside said decorative light pedestal.

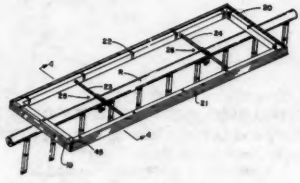
4,986,505

ENCLOSED PATIO TABLE

Stanley M. Zabawski, Noxon Rd., and Edward L. Dombroski, 16 Catskill Ave., both of Poughkeepsie, N.Y. 12603

Filed Aug. 21, 1989, Ser. No. 396,070
Int. Cl.[5] A47B 5/00
U.S. Cl. 248—214 9 Claims





1. An enclosed patio table adapted for mounting on a railing of a fence, comprising:

an elongated generally rectangular frame having first and second spaced parallel side members connected by first and second spaced parallel end members;

an elongated rectangular base sheet overlying said side and end members;

a plurality of spaced parallel threaded rods extending between said side members, beneath said base sheet;

a pair of mirror symmetrically oriented clamping brackets on each of said threaded rods;

each of said clamping brackets having first and second spaced parallel flange portions connected by a perpendicular leg portion, a third flange portion transversely connected to said first flange portion and extending in spaced parallel relation with said leg portion, an aperture formed through said leg portion adjacent said first flange portion, said aperture receiving said threaded rod with clearance, said third flange portion terminating above said threaded rod and having an arcuate notch for engagement with said threaded rod, and a thumb screw extending transversely through said second flange portion for clamping engagement with a fence railing; and

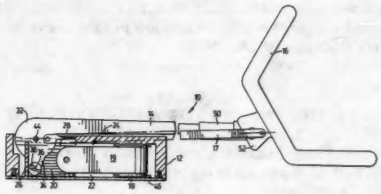
an enclosure mounted on said frame for movement between open and closed positions, said enclosure forming a protected environment around said base sheet for storing food and beverages.

4,986,506

SUSPENSION ARM

Alex Karapita, 38 Robinter Dr., Willowdale, Ontario, Canada M2M 3R2

Filed Jan. 3, 1989, Ser. No. 292,958
Claims priority, application United Kingdom, Jan. 4, 1988, 8800057
Int. Cl.[5] E04G 3/00
U.S. Cl. 248—280.1 15 Claims



1. In combination:

a base

a main arm pivotally mounted to said base for swinging movement in a given plane about an axis, the main arm being adapted to resist a force acting thereon in said given plane at a location remote from said axis,

a crank arm fixed with respect to the main arm and supporting a cam follower, said cam follower being located such that a hypothetical line within said given plane extending from said axis to said follower is substantially perpendicular to the direction of said main arm,

a carriage mounted for movement with respect to said base within said given plane and defining a cam wall against which said follower bears,

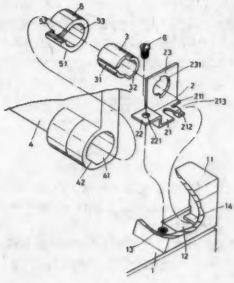
and constant force spring means continuously urging said cam wall against said follower in a direction which places a torque on the main arm so as to counterbalance the said force.

4,986,507

FREE POSITIONING TILT UNIT

Arthur Chiang, 3F, No. 19, Chih Cheng Rd., Sec. 2, Shih Lin Taipei, Taiwan

Filed Oct. 27, 1989, Ser. No. 427,382
Claims priority, application Taiwan, Sep. 8, 1989, 7820873
Int. Cl.[5] F16M 11/00
U.S. Cl. 248—291 2 Claims



1. A free positioning to tilt unit, including a main frame, a mounting bracket element secured to said main frame and comprising a retaining notch made thereon for securing thereto of a sleeve; a sleeve comprising a crevice cut there-

through along an axial direction and a curved flange extending therefrom at one end; a display unit comprising an axle housing having at least one tangent plane internally made thereon for securing a bushing thereto; and a bushing comprising at least one tangent plane externally made thereon; wherein said bushing is firmly secured to said axle housing, by means of the engagement of the internal tangent plane of said axle housing and the external tangent plane of said bushing, so as to allow said display unit to move; and said sleeve is elastically deformed by means of the effect of said crevice when said sleeve is inserted into said bushing such that a constant torque is obtained during the relative rotation of said sleeve and said torsion shaft against each other.

4,986,508

ATTACHING DEVICE FOR A DUST COVER OF A LINEAR GUIDE APPARATUS

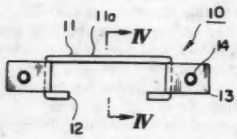
Nobuyuki Osawa, Takasaki, and Yoshinori Mizumura, Maebashi, both of Japan, assignors to Nippon Seiko Kabushiki Kaisha, Tokyo, Japan

Filed Nov. 21, 1989, Ser. No. 439,818

Claims priority, application Japan, Nov. 22, 1988, 63-152363; Aug. 25, 1989, 64-99183

Int. Cl.[5] A47F 5/00

U.S. Cl. 248—300 **7 Claims**



1. An attaching device for a dust cover mounted on an end of a guide rail of a linear guide apparatus, wherein said linear guide apparatus includes the guide rail having axial rolling member rolling grooves in both lateral sides, a slider loosely and movably fitted about said guide rail and having rolling member rolling grooves respectively opposing rolling member rolling grooves of said guide rail, and a plurality of rolling members rollably fitted in the opposing rolling member rolling grooves, and wherein said dust cover includes a bellows which covers said guide rail and has one end fixed to said slider and the other end fixed to said attaching device, said attaching device comprising;

a plate-shaped main body having fitting plate portions formed by bending both lateral side plate portions of said plate-shaped main body inwardly so that said plate-shaped main body straddles an upper surface of said guide rail and sandwiches both lateral sides of said guide rail; and

a bellows attaching plate portion provided at one axial end of said plate-shaped main body perpendicularly to an upper surface of said plate-shaped main body.

4,986,509

SEAT LIFTER

Takami Suzuki; Isamu Chinomi; Yuji Tanaka, and Isao Kuwabara, all of Kanagawa, Japan, assignors to Ikeda Bussan Co., Ltd., Ayase, Japan

Filed Jun. 21, 1989, Ser. No. 369,688

Claims priority, application Japan, Sep. 29, 1988, 63-127826[U]

Int. Cl.[5] F16M 11/12

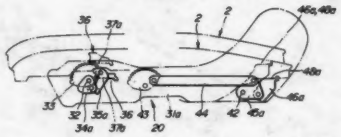
U.S. Cl. 248—396 **15 Claims**

1. A seat lifter comprising:

spaced side base members; and

front and rear lift mechanism which are mounted on front and rear portions of said side base members for adjusting the heights of front and rear portions of a seat cushion, respectively.

wherein each lift mechanism comprises a pivot shaft extending across said side base members, brackets secured to said pivot shaft to rotate therewith, arm members pivotally connected to said brackets and connected to said seat cushion so that rotation of said pivot shaft induces pivotal



movements of said brackets about the pivot shaft thereby selectively lifting and lowering said seat cushion; a sector gear pivotally held by one of said side base members and pivotally moved together with said pivot shaft, a pinion meshed with said sector gear, and a handling knob mounted on one of said side base members and having said pinion connected thereto.

4,986,510

HYDRAULIC ANTIVIBRATORY DEVICES

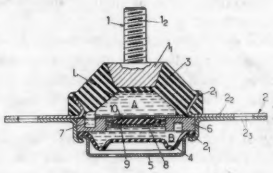
Alain Bellamy, and Ludovic Chauvet, both of Vendome, France, assignors to Hutchinson, Paris, France

Filed Jun. 8, 1989, Ser. No. 363,266

Claims priority, application France, Jun. 9, 1988, 88 07699

Int. Cl.[5] F16F 9/10

U.S. Cl. 248—562 **1 Claim**



1. A hydraulic antivibratory device intended to be interposed between two rigid elements, comprising: two rigid frames (1,2) which can be fixed respectively to the two rigid elements to be joined together; an elastomer body (3) connecting the two frames together and forming two sealed chambers (A, B) at least partially therewith; a restricted passage (7) causing the two chambers to communicate permanently with each other; a liquid mass (L) filling the two chambers and the restricted passage; and a deformable valve (8) in the form of a biconvex lens partially defining one of the two chambers (A), said valve being mounted with a possibility of limited deformation between two flat and parallel grids (9, 10) disposed respectively in said one of the two chambers and in a third chamber and with a central zone of said bicovex lens shaped valve permanently in contact with the two grids and clamped therebetween.

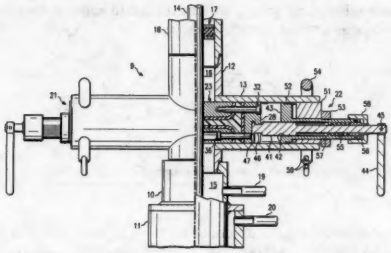
4,986,511
SEAL STRUCTURE FOR ELEVATED TEMPERATURE SERVICE

Richard E. Irby, Duncanville; G. Stephen Kyker, Fort Worth; Lorenzo P. DiSano, Kingwood, and Eduardo Alvarez, Houston, all of Tex., assignors to Dresser Industries, Inc., Dallas and Hoechst Celanese Corporation, Houston, both of, Tex., a part interest

Filed Dec. 14, 1989, Ser. No. 450,622

Int. Cl.[5] E21B *33/00*

U.S. Cl. 251—1.3 **36 Claims**



1. A seal structure suitable for use with high pressure and elevated temperatures which comprises:

first and second spaced apart high temperature seal layers for providing effective sealing action at elevated temperatures, a lower temperature seal layer for providing effective sealing action at temperatures below said elevated temperatures, said lower temperature seal layer being positioned between said first and second high temperature seal layers;

each of said first and second high temperature seal layers having a compressive modulus of elasticity at 72° F. (ASTM D 695-85) in the range of about 500,000 psi to about 2,500,000 psi, a coefficient of linear thermal expansion in the range of about 10×10^{-6} in/in/°F. to about 20×10^{-6} in/in/°F. for the temperature range of 75° to 300° F., and a Rockwell A hardness in the range of about 55 to about 65; and

said lower temperature seal having a compressive modulus of elasticity at 72° F. (ASTM D 695-85) in the range of about 25,000 psi to about 250,000 psi, a coefficient of linear thermal expansion in the range of about 5×10^{-5} to about 10×10^{-5} in/in°F. for the temperature range of 75° to 300° F., and a Shore D hardness in the range of about 50 to about 65.

4,986,512
SERVO PISTON VALVE

Edelbert Tiefenthaler, Elgg, Switzerland, assignor to Sulzer Brothers Limited, Winterthur, Switzerland

Filed Apr. 19, 1990, Ser. No. 510,959

Claims priority, application Switzerland, Apr. 27, 1989, 01609/89

Int. Cl.[5] F16K *1/12, 31/124*

U.S. Cl. 251—33 **16 Claims**

1. A valve comprising

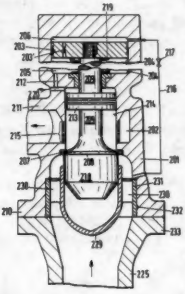
a valve housing having an inlet port for connection to a pressure medium supply, an outlet port for connection to a pressure medium sink, a first cylindrical chamber between and in communication with said ports, a valve seat between said inlet port and said chamber, and a second cylindrical chamber spaced from said first cylindrical chamber;

a valve lid disposed in said housing in seated relation with said valve seat to block a flow of pressure medium from said inlet port into said first chamber;

a servopiston slidably mounted in said second cylindrical chamber to sub-divide said second chamber into a pair of sub-chambers;

a spindle connecting said valve lid and said servopiston and extending through said cylindrical chambers;

a compensation piston on said spindle and slidably mounted in said first chamber to sub-divide said first chamber into two sub-chambers, said sub-chamber between said compensation piston and said valve seat being in communication with said outlet port;



means for selectively pressurizing at least one of said sub-chambers of said second chamber to move said lid relative to said valve seat;

an extension on said valve lid extending upstream of said valve seat;

a hollow flow deflector disposed in said housing and receiving said extension therein for deflecting a flow of pressure medium from said inlet port about said extension; and

said lid and said compensating piston have mutually facing end surfaces of substantially the same diameter.

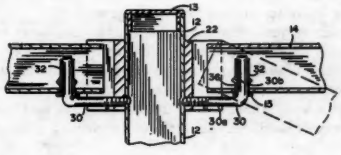
4,986,513
FENCE CONNECTOR ASSEMBLY

David H. Schultz, Grand Haven; Steven W. Mattson, Muskegon, and Donald E. Heinz, West Olive, all of Mich., assignors to Harbor Towne Fence, Inc., Grand Haven, Mich.

Filed May 7, 1990, Ser. No. 520,275

Int. Cl.[5] E04H *17/14*

U.S. Cl. 256—65 **1 Claim**



1. A fence assembly comprising:

a substantially vertical post, a connector assembly and a generally horizontal rail having two ends;

said connector assembly comprising a connector bracket, said connector bracket having a vertical sleeve defining a vertical cavity for receiving a post;

said sleeve having at least one pair of laterally spaced side members projecting from at least one side of said sleeve, said side members being substantially parallel to each other and spaced apart sufficient to receive one end of at least one rail therebetween;

a threaded aperture through said sleeve;

said members being astraddle said aperture;

at least one L-shaped mounting stud having a substantially horizontal leg and an upwardly oriented substantially vertical leg, said horizontal leg being in threaded engagement with said aperture for securing said connector bracket to the post, and said vertical leg having a distal end spaced from said bracket sleeve; and

said rail having a vertical opening spaced from the end of said rail, said opening being larger than said distal end of the said vertical leg to freely fit thereover, and being spaced from the end of said rail an amount less than the spacing of said distal end from said sleeve to space the end of said rail from said sleeve and allow said rail to have limited pivotal movement on said vertical leg between said side members to accommodate uneven terrain.

4,986,514

SEAT RECLINING DEVICE

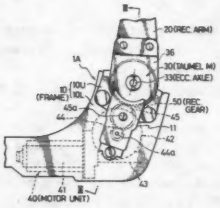
Isao Ikegaya; Tadashi Matsumoto, and Kunihisa Sugimoto, all of Shizuoka, Japan, assignors to Fujikiko Kabushiki Kaisha, Tokyo, Japan

Filed Oct. 16, 1989, Ser. No. 422,403

Claims priority, application Japan, Oct. 31, 1988, 63-141181[U]; Jan. 31, 1989, 1-10070[U]

Int. Cl.[5] B60N *1/06*

U.S. Cl. 297—362 **5 Claims**



1. A seat reclining device for an automobile comprising:

a seat having a seat cushion and a seat back;

a base frame fixed to a side surface of said seat cushion;

a reclining arm fixed to a side surface of said seat back;

A Taumel gear reduction mechanism pivotally supporting said reclining arm on said base frame, said Taumel gear reduction mechanism comprising an inner gear formed in said reclining arm, an outer gear formed in said base frame in mesh with said inner gear, and an eccentric axle mounted to said outer gear, said inner gear having at least one more tooth than said outer gear;

a reclining gear mounted to an outside surface of said base frame for driving said eccentric axle of said Taumel gear reduction mechanism for pivoting said reclining arm relative to said base frame; and

a motor unit mounted to an inside surface of said base frame opposite said outside surface for driving said reclining gear.

4,986,515

WATER TABLE WITH WORK SUPPORTS

Harry E. Anderson, 307 Foxcroft Rd., Pittsburgh, Pa. 15220

Filed Apr. 9, 1990, Ser. No. 506,695

Int. Cl.[5] B23K *7/08*

U.S. Cl. 266—49 **20 Claims**

1. A water table with a work support arrangement for use with a burning machine comprising:

a tank for holding water having a plurality of sidewalls, a bottom and an open top;

a frame mounted in said open top of said tank, said frame having a bottom wall and means for supporting a metal workplate;

one or more means for supporting a metal workplate positioned on the bottom wall of said frame and extending upwardly to contact the lower surface of a workplate located on said frame;

a cutting gantry mounted on rails located on opposite sides of said tank for movement in a first direction relative to said frame, said cutting gantry adapted to slidably carry a burning machine for movement in a second direction relative to said first direction;

a first support gantry mounted on said rails on one side of said cutting gantry;

a second support gantry mounted on said rails on the opposite side of said cutting gantry;

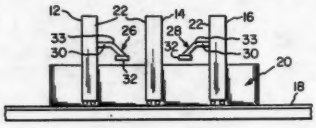


plate support means mounted on each of said first and second support gantries: for slidable movement relative to said frame in said second direction;

said plate support means on said support gantries having a cantilever arm pivotally mounted at one end to said support gantry and a contact head mounted on the distal end of said cantilever arm, whereby each of said contact heads is adjustable to contact the upper surface of a metal plate by pivoting said cantilever arm; and

control means for adjusting said means for contacting the upper and lower surfaces of a workplate at preselected locations with respect to a cutting path created by a burning machine when said workplate is positioned on said frame.

4,986,516

SEALING SHUTTER FOR A SHAFT FURNACE

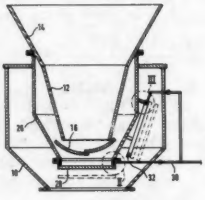
Emile Lonardi, Bascharage, Luxembourg, assignor to Paul Wurth S.A., Luxembourg, Luxembourg

Filed Dec. 8, 1989, Ser. No. 447,992

Claims priority, application Luxembourg, Dec. 30, 1988, 87419

Int. Cl.[5] C21B *7/08*

U.S. Cl. 266—87 **8 Claims**



1. An apparatus for sealing a flow-off orifice of a charging lock for charging a shaft furnace, comprising:

a first annular seat circumscribing the orifice;

an annular internal channel within the first annular seat;

means for circulating a temperature regulating fluid through the channel to regulate the temperature of the first annular seat;

a shutter for sealing the orifice;

an annular gasket secured to a surface of the shutter;

said shutter having a closed position in which the annular

gasket is disposed in contact with the annular seat to seal the orifice and an open position in which the annular gasket is set apart from the annular seat.

4,986,517

APPARATUS FOR POURING MOLTEN METALS

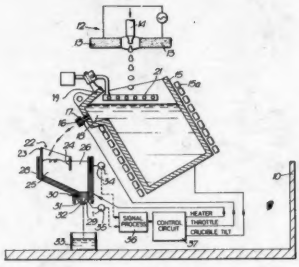
David A. Ford, Bristol; Gordon J. S. Higginbotham, Derby; David R. Pugh, Bristol, and Naresh Kumar, Birmingham, all of England, assignors to Rolls-Royce plc, London, England

Filed Dec. 20, 1989, Ser. No. 453,998

Claims priority, application United Kingdom, Dec. 20, 1988, 8829690

Int. Cl.[5] F27B *14/06, 14/20*

U.S. Cl. 266—234 **5 Claims**



1. A combined crucible, pouring reservoir and spout comprising:

a crucible having a side wall;

a heating means positioned adjacent said side wall of said crucible for heating contents in said crucible;

said side wall having an outward projection on one side adjacent the top thereof, said outward projection comprising a pouring reservoir defined by tapered walls extending from said crucible; and

a pouring spout located in said pouring reservoir;

such that when liquid is poured from said crucible, said pouring reservoir fills with said liquid, thereby forming a reservoir of said liquid beneath a surface of said liquid as said crucible is rotated through increasing angles of tilt during pouring.

4,986,518

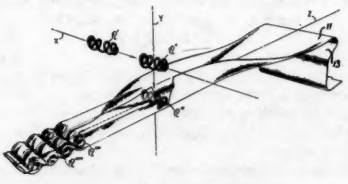
POCKETED COIL STRINGS HAVING A FLAT OVERLAP SIDE SEAM

Walter Stumpf, Dunwoody, Ga., assignor to Simmons U.S.A. Corporation, Atlanta, Ga.

Division of Ser. No. 205,920, Jun. 13, 1988, Pat. No. 4,854,023. This application May 19, 1989, Ser. No. 354,482

Int. Cl.[5] F16F *3/04; A47C 27/04*

U.S. Cl. 267—91 **12 Claims**



1. An encapsulated spring, comprising:

a spring having an axis of compression; and

a sheet of flexible material encapsulating said spring, said material having opposing edges and opposing first and second faces and being formed in a tubular configuration such that said edges are in a flat overlap configuration with a portion of said first face facing a portion of said second face, said tubular configuration having a longitudinal axis substantially orthogonal to said axis of compression of said spring, said tubular configuration of said material including first and second transverse seams positioned on opposing sides of said spring, each of said seams having an axis substantially parallel to said axis of compression of said spring.

4,986,519

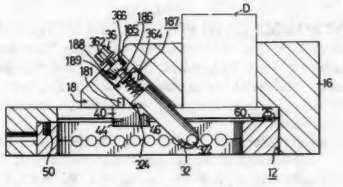
VICE

Chi-Jen Lee, No. 1-7, Lane 248, Chung Chen Rd., Shu Lin Chen, Taipei Hsien, Taiwan

Filed Jun. 20, 1990, Ser. No. 540,703

Int. Cl.[5] B23Q *3/06*

U.S. Cl. 269—137 **3 Claims**



1. A vice comprising a base with a track, a rectangular positioning body, a block and a fastening means, said base having a fixed jaw formed at a first end thereof and a movable jaw being movably provided on said track adjacent to a second end of said base for holding a processing material in cooperation with said fixed jaw, said base having a central first slot extending along a length thereof, a first rectangular recess being formed on an underside of said base and extending along a length of said first slot for receiving said rectangular positioning body;

said movable jaw having an inclined surface which faces said second end of said base, said inclined surface having a through hole formed therein which penetrates to said underside of said movable jaw in a direction substantially perpendicular to a plane on which said inclined surface is located, said through hole communicating with said slot of said base, a dowel protruding from said underside of said movable jaw for engaging with a recess of said block;

said rectangular positioning body having a second central slot extending longitudinally and defining two longitudinal side walls, a plurality of holes being formed on each longitudinal side wall of said positioning body, a second recess being provided on said underside of said positioning body and extending longitudinally along a length of said second slot and extending transversely a distance half a width of said longitudinal side walls such that said holes are notched, a projection protruding from an end of said top surface of said positioning body and being located below said fixed jaw when said positioning body is received in said first recess of said base;

said fastening means comprising a substantially cylindrical screw receiver, a spring and a fastening screw, a rectangular protrusion being formed on an upper portion of said screw receiver and a central threaded hole being formed in said screw receiver for receiving and engaging with said fastening screw, said screw receiver having a pin penetrating a pin hole on a lower portion of said screw receiver with two exposed lugs, a screw stop being provided on the fastening screw above a threaded portion of said fastening screw for preventing said fastening screw from dislodging from said through hole;

said block having a recess formed on a top face thereof for

engaging with said dowel of said movable jaw, two wings being symmetrically provided on a middle portion of both lateral surfaces of said block and extending transversely, forming an overhang for resting on a top surface of said positioning body, a stop being formed on said block opposite to said two wings, said block having a width the same as said second slot of said positioning body such that said block is longitudinally slidable within said second slot with said two wings resting on said top surface of said positioning body;

in a tightened state, said movable jaw is fixed on said base in which said lugs engage with an upper periphery of one pair of said notched holes; and

in a released state, said movable jaw is slidable along said track of said base while said lugs disengage with said upper periphery of said notched holes and said protrusion of said screw receiver contacts with said stop of said block.

4,986,520

CONTROL METHOD FOR SORTER WITH STAPLER

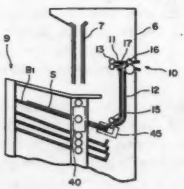
Hironori Shido; Jun Saito, both of Kawasaki; Masakazu Hiroi, Yokohama; Kenji Kobayashi, Tokyo; Koichi Murakami, Yokohama; Masataka Naito, and Takeshi Honjo, both of Kawasaki, all of Japan, assignors to Canon Kabushiki Kaisha, Tokyo, Japan

Continuation of Ser. No. 226,063, Jul. 29, 1988, abandoned. This application Mar. 22, 1990, Ser. No. 501,427

Claims priority, application Japan, Jul. 30, 1987, 62-191934; Jul. 30, 1987, 62-191936; Jul. 30, 1987, 62-191937; Jul. 30, 1987, 62-191938; Aug. 7, 1987, 62-197786; Aug. 10, 1987, 62-200288; Aug. 10, 1987, 62-200289

Int. Cl.[5] B42B *1/02*

U.S. Cl. 270—53 **6 Claims**



1. A method of controlling a sheet sorter wherein said sheet sorter includes a plurality of bins for accommodating sheets, the bins being arranged in a vertical direction, a first sheet discharging means for discharging sheets not to be sorted, second sheet discharging means for discharging sheets to be sorted, bin moving means for moving substantially vertically the bins and stapler means for stapling the sheets, said method comprising:

providing said stapler means adjacent to the second sheet discharging means;

accommodating the sheets on the plurality of bins by sequentially opposing the bins to said second sheet discharging means, and, after termination of accommodation to each bin, stapling the sheets on the bins by the stapler by sequentially opposing the bins to said stapler, when a sorting mode is selected; and

discharging the sheets by said first discharging means and accommodating them on a non-sort bin opposed to said first discharging means when a non-sort mode is selected, and, after termination of accommodation to said non-sort bin, moving the non-sort bin to a neighborhood of the second discharging means where the sheets thereon are stapled by the stapler means.

4,986,521

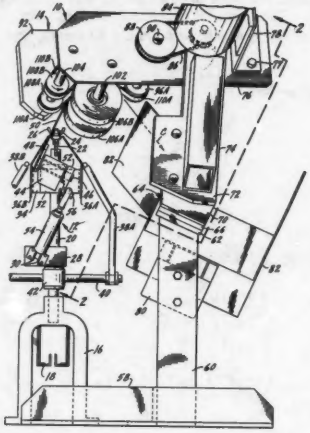
REJECT DEVICE FOR A SIGNATURE GATHERING MACHINE

Raymond I. Bulka, Oak Lawn, and George D. Higgins, Orland Park, both of Ill., assignors to McCain Manufacturing Corp., Chicago, Ill.

Filed Mar. 6, 1989, Ser. No. 319,093

Int. Cl.[5] B65H *39/02*

U.S. Cl. 270—54 **16 Claims**



1. In a signature gathering machine of the type having a plurality of signature feeders which place individual signatures on a moving gathering chain to form books, sensor means for detecting a misformed book, the signatures being draped over the gathering chain with their backbones supported by the chain, the gathering chain including a plurality of pins, each pin being engageable with the trailing edge of a particular group of signatures on the chain to advance said group of signatures past the signature feeders and further to advance fully-gathered books toward finishing stations such as stapling, trimming and labeling stations, the improvement comprising a reject device for removing misformed books from the gathering chain, the reject device comprising:

extractor means responsive to the sensor means for engaging a misformed book and immediately accelerating the trailing edge of said misformed book out of contact with the gathering chain pin associated with that book so as to redirect its path off of the gathering chain and wherein the extractor means comprises take-away means for withdrawing a misformed book from the gathering chain by accelerating the book longitudinally of the gathering chain and simultaneously moving it vertically of the chain.

4,986,522

PRINTING PRESS FEED MECHANISM

Harold E. Paulson, 360 Wynland Trace, Dunwoody, Ga. 30350

Filed Sep. 27, 1989, Ser. No. 413,435

Int. Cl.[5] B65H *3/10*

U.S. Cl. 271—2 **9 Claims**

1. A system for individually feeding envelopes from a stack of envelopes to a work station, comprising:

a hopper for holding a multitude of envelopes in flat stacked relationship with the flap edge of the envelope as the leading edge;

an elongated cylindrical feed roller located under the stacked envelopes in said hopper;

an elongated vacuum passageway along the axis of said feed roller;

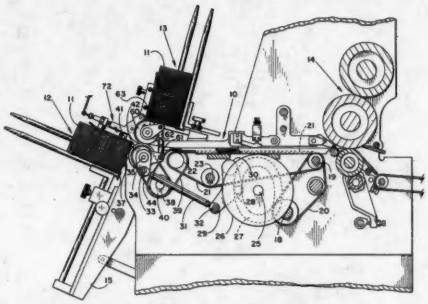
a generally cylindrical vacuum drum coaxially mounted on said feed roller for rotational movement therewith in close

proximity to the bottom envelope in said hopper, said drum having an interior vacuum chamber in vacuum communication with said roller vacuum passageway and a series of exterior vacuum outlet ports for applying vacuum to the lowermost envelope in the stack;

a vacuum source;

a vacuum source passageway coupling said vacuum source to one end of said roller vacuum passageway;

valve means in said vacuum source passageway operated by



said feed roller, said valve means operable between an open condition and a closed condition as said feed roller reciprocably rotates between a first and a second position;

continuously moving carrier means;

means for reciprocably rotating said feed roller and said vacuum drum between a first position and a second position for withdrawing the bottom envelope from said hopper; and

means for delivering each withdrawn envelope from said feed roller to said carrier means.

4,986,523

DOCUMENT FEEDER FOR PRINTING EQUIPMENT

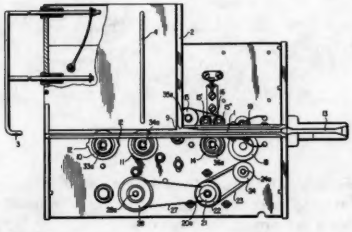
Emilio B. Martin, Madrid, Spain, assignor to Amper, S.A., Madrid, Spain

Filed May 3, 1989, Ser. No. 346,998

Claims priority, application Spain, May 4, 1988, 8801366

Int. Cl.[5] B65H *5/00*

U.S. Cl. 271—10 **36 Claims**



1. A document feeder for supplying documents to a document processing system comprising:

a plate for stacking a plurality of documents thereon, said plate having a slot therein;

a first wheel for pulling said documents, said plate inclined so that said stack of documents rest continually against the first pull wheel;

a pushing element for acting on said stack of documents, said pushing element guided by said slot, said pushing element exerting a substantially constant and uniform force on said stack of documents;

a guide having first and second sides, said documents passing one by one through said guide towards said processing system, said first wheel pulling said documents towards said guide; and

selection means positioned within said guide for selecting documents to be passed one by one through said guide; wherein

said selection means comprises a first roller placed on said first side of said guide, said first roller having first, second and third toric projections mounted thereon, and first, second and third rollers placed on said second side of said guide, said first roller on said second side positioned forward of said first roller on said first side and said second and third rollers on said second side, said second roller on said second side having first and second toric projections mounted thereon, said toric projections on said first and second sides defining a support surface through which said documents pass.

4,986,524

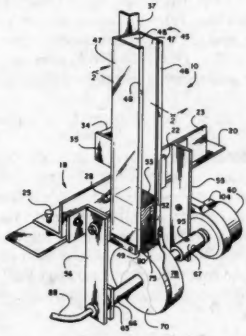
LABEL INJECTOR FOR HEMMING MACHINES

John C. Meintzer, Jr., Milner, and Michael E. Chandler, Meansville, both of Ga., assignors to Dundee Mills, Inc., Griffin, Ga.

Filed Jan. 4, 1989, Ser. No. 293,210

Int. Cl.[5] B65H *3/08*

U.S. Cl. 271—100 **29 Claims**



1. An apparatus for placing labels and the like onto a moving workpiece, comprising:

a magazine containing a plurality of labels;

an applicator wheel positioned between said magazine and a moving workpiece and rotatable about an axis perpendicular to the direction of movement of said workpiece, said applicator wheel including means for removing a label from said magazine and retaining said label on said applicator wheel;

means for rotating said applicator wheel relative to said workpiece while said label is retained on said applicator wheel until said label is located between said applicator wheel and said workpiece;

means for releasing said label from said applicator wheel, whereby said label is placed upon said workpiece; and

means for returning said applicator wheel to its original orientation prior to removing said label from said magazine.

4,986,525

SHEET FEED DEVICE FOR USE IN A PRINTER OR THE LIKE

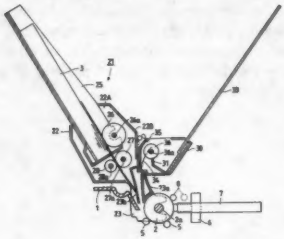
Kazuhiko Takagi, Nagoya; Rikuo Sonoda, Nishikasugai, and Kazuo Umemura, Nagoya, all of Japan, assignors to Brother Kogyo Kabushiki Kaisha, Japan

Filed Jan. 22, 1990, Ser. No. 468,204

Claims priority, application Japan, Jan. 25, 1989, 1-15287; Feb. 3, 1989, 1-26401

Int. Cl.[5] B65H *3/06*

U.S. Cl. 271—114 **16 Claims**



14. A sheet feed device for feeding a sheet-like material in a sheet feeding direction, comprising:

a main feed roller rotatable about its own axis extending in a direction which is transverse to the sheet-like material to be fed, said main feed roller having a main feed roller gear secured to the axis of said main feed roller;

an auxiliary feed roller rotatable about its own axis extending in parallel to the axis of said main feed roller, said main and auxiliary feed rollers cooperating with each other to frictionally feed the sheet-like material in the sheet feeding direction, said auxiliary feed roller having an auxiliary feed roller gear secured to the axis of said auxiliary feed roller;

a motor for rotating said main roller at a given rotational speed;

a clutch mechanism, operatively connected to said main feed roller and said auxiliary roller, for transmitting the rotation of said main feed roller to said auxiliary feed roller when said auxiliary feed roller rotates at a rotational speed slower than a predetermined speed and for cutting the transmission of the rotation of said main feed roller to said auxiliary feed roller when said auxiliary feed roller rotates at a rotational speed faster than the predetermined speed.

4,986,526

SHEET REGISTRATION CALIBRATION

Richard M. Dastin, Fairport, N.Y., assignor to Xerox Corporation, Stamford, Conn.

Filed Sep. 25, 1989, Ser. No. 411,790

Int. Cl.[5] B65H *9/12*

U.S. Cl. 271—227 **16 Claims**

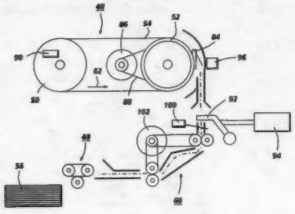
1. A method of calibrating sheet registration with a sheet gripper on a transport, including the steps of:

timing the movement of the sheet gripper moving with the transport from a first reference position until the sheet gripper arrives at a predetermined location in a loading zone to determine a first time;

adjusting the movement of the sheet transport so that the first time is preselected time;

timing the movement of the sheet from a second reference position until the sheet arrives at the predetermined location in the loading zone to determine a second time; and

adjusting the movement of the sheet so that the second time is the preselected time so that the sheet and the sheet



gripper arrive at the loading zone substantially simultaneously.

4,986,527

METHOD AND MECHANISM FOR FEEDING AND POSITIONING A SHEET

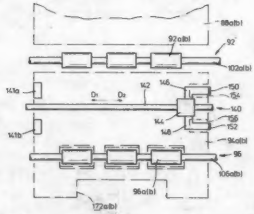
Makoto Ogoda, Kanagawa, Japan, assignor to Fuji Photo Film Co., Ltd., Kanagawa, Japan

Filed Mar. 17, 1989, Ser. No. 324,861

Claims priority, application Japan, Mar. 18, 1988, 63-65056

Int. Cl.[5] B65H *9/10*

U.S. Cl. 271—250 **9 Claims**



1. A method of feeding and positioning a sheet for reading an image from the sheet or reproducing an image from the sheet, said method comprising the steps of:

gripping the sheet with at least one pair of rollers to feed the sheet;

displacing said rollers away from each other to release the sheet between the rollers;

displacing the sheet in a predetermined direction to position the sheet in a prescribed position; and

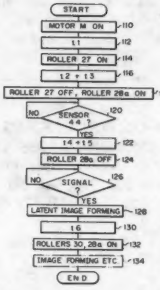
gripping the positioned sheet again with said rollers to feed the sheet toward an image reading or reproducing mechanism, wherein said step of displacing the sheet comprises the step of displacing the sheet in a lateral direction substantially perpendicular to the direction in which the sheet is fed by said rollers, by engaging a lateral edge of the sheet and pushing the sheet in said lateral direction.

4,986,528

METHOD OF SEPARATELY FEEDING A PRINT MEDIUM SHEET AND APPARATUS THEREFOR

Shinichi Watarai, Yokohama; Yoji Houki, Tokyo, and Tomohiro Nonomura, Takasago, all of Japan, assignors to Fujitsu Limited, Kawasaki, Japan

Filed Jun. 2, 1989, Ser. No. 360,698
Claims priority, application Japan, Jun. 7, 1988, 63-140133
Int. Cl.[5] G03G *15/00*
U.S. Cl. 271—265 **7 Claims**



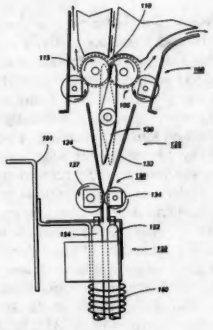
1. A method of separately feeding a print medium sheet from a pile of print medium sheets to an image-forming area for forming an image on the sheet, characterized int hat at least two pairs of feed rollers are provided in a path of the sheet between said pile and said image-forming area, that a sheet is fed by a pick-up roller for picking up a sheet from said pile to a pair of feed rollers which are not rotating, and after a predetermined time has passed while said sheet remains in contact with said pair of feed rollers, said pair of feed rollers start to rotate to feed said sheet to a second pair of feed rollers, which are not rotating, and after a predetermined time has passed while said paper sheet remains in contact with said second pair of feed rollers, said second pair of feed rollers start to rotate to feed said sheet.

4,986,529

FOUR ROLL INVERTER

Vinod K. Agarwal, Webster, N.Y.; Barry M. Dixon, Herts, England; Joseph C. Foerster, Webster, and Gregory G. Jones, Rochester, both of N.Y., assignors to Xerox Corporation, Stamford, Conn.

Filed Oct. 17, 1988, Ser. No. 258,944
Int. Cl.[5] B65H *29/60*
U.S. Cl. 271—291 **20 Claims**



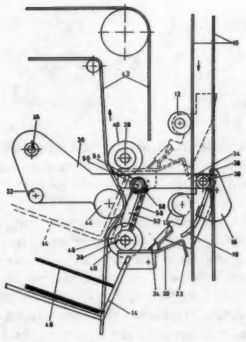
1. An inverter apparatus for handling multiple sized sheets, including four rollers providing three sheet-feeder nips; a solenoid-actuated diverter having a portion thereof position upstream of the center nip, a single sheet pocket comprising at least one partially split tubular member into which sheets can pass after having contacted said diverter, a corrugation nip positioned downstream of said diverter, and a low-rate linear compression spring surrounding a portion of said sheet pocket for urging the sheets back towards either of said two other nips.

4,986,530

SORTING APPARATUS FOR DOCUMENT SHEETS AND THE LIKE

Helmut Steinhilber, Sonnenbergstrasse 40, 6052, Hergiswil, Switzerland

Filed Mar. 10, 1989, Ser. No. 321,858
Claims priority, application Fed. Rep. of Germany, Mar. 12, 1988, 3808332
Int. Cl.[5] B65H *29/18*
U.S. Cl. 271—297 **17 Claims**



1. Sorting apparatus for document sheets and the like with a feed track for the sheets, with stacker bins installed consecutively in the conveyance direction of the sheets at an angle to the feed track, with a deflector for each of the bins that can be swung into the plane of the feed track in order to guide a sheet from the feed track into the corresponding stacker bin, and with a roller transporter interacting with a guide plate, which conveys the sheet of paper from the deflector to the stacker bin, characterized by the fact that between each deflector (16) and each stacker bin (14) there is installed a roller transporter (26), that the roller transporters (26) are equipped with wheel pulleys (40) that can be driven by a revolving belt (42) common to all roller transporters (26), that the belt (42) moves freely with radial clearance along the wheel pulleys (40), and that to each stacker bin (14) is assigned a clutch wheel (44) which, with activating of the corresponding deflector (16), can be moved into a coupling position, in which it presses the belt (42) into gear with the corresponding wheel pulley (40).

4,986,531

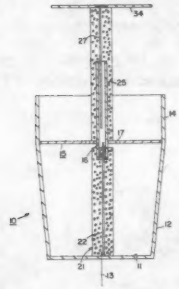
WATER-ACTUATED NOVELTY

Alvin A. Snaper, 2800 Cameo Cir., Las Vegas, Nev. 89107, and Merrill Heatter, 1011 N. Roxbury Dr., Beverly Hills, Calif. 90210

Filed Dec. 19, 1989, Ser. No. 452,837
Int. Cl.[5] A63G *5/00*
U.S. Cl. 272—27 N **10 Claims**

1. A novelty adapted to be stored in a dry reduced format and expanded to form a larger display upon addition of water, comprising:

a base, the novelty having a central axis rising from said base;
a first rod fixed to said base;
a lateral restraint structurally connected to said base above the base, said restraint having an aperture therethrough on said central axis;
a sleeve slidably fitted in said aperture;
a second rod, both of said rods extending axially and telescopically fitted to said sleeve;
a first capsule fixed to said base, said sleeve being mounted to the upper end of said first capsule, said rod passing through said first capsule;

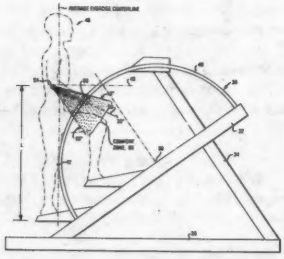


a second capsule fixed to said lateral restraint, said sleeve being fitted in the lower end of said second capsule, said second rod passing through said second capsule from its top;
said capsules being formed of a dried, compressed material which upon application of water to it swells so as to elongate along said axis, said first capsule moving said sleeve in the lateral restraint to extend farther above said lateral restraint, said second rod rising with the upper end of the second capsule, the telescopic engagement of the rods and sleeve, and the fitting of the sleeve on the lateral restraint, enabling the axial elongation to occur while providing support against excessive bending of the wetted second capsule material.

4,986,532

HAND RAIL FOR STAND-UP EXERCISE EQUIPMENT

Richard J. DeCloux, 1485 Belmont St., Manchester, N.H. 03104
Filed Feb. 14, 1988, Ser. No. 311,068
Int. Cl.[5] A63B *1/00, 23/04*
U.S. Cl. 272—70 **5 Claims**

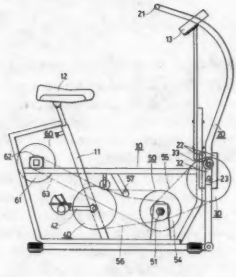


1. Stand-up aerobic exercise equipment to permit comfortable, stable exercise when an individual is using said equipment, comprising:
a stand-up exercise device having a frame and moveable foot engaging means such that when an individual mounts said device facing in a given direction and when an individual's feet engage said foot engaging means, the individual's body when erect defines an average exercise centerline centered on said foot engaging means when said individual is in position thereon,
a handrail having as a major portion a bendless arc; and,
means for both anchoring at least one end of said handrail to said frame behind said individual when in position on said foot engaging means, and for locating said bendless arc at said device so that a tangent to said bendless arc is parallel to said individual's average upright exercise centerline when said individual is using said device, said tangent being within eight inches of said average upright exercise centerline.

4,986,533

MAGNETICALLY CONTROLLED EXERCISE BICYCLE FOR EXERCISING ARMS AND LEGS

Peter K. Lo, P.O. Box 13-124, Taipei, Taiwan
Filed Jul. 30, 1990, Ser. No. 560,799
Int. Cl.[5] A63B *21/00*
U.S. Cl. 272—73 **6 Claims**



1. An exercise bicycle comprising:
a frame assembly including a seat disposed thereon;
a pair of swing levers, connected pivotally to said frame assembly at lower ends of said swing levers, each of said swing levers having a lengthwise extending slide slot formed therein;
a front wheel assembly including a front shaft journalled on a front portion of said frame assembly, a front wheel sleeved rigidly on said front shaft, and two front crank arms, each secured to an end of said front shaft, said front crank arms being respectively received slidably in said slide slots;
a rear wheel assembly including a rear shaft journalled on a rear portion of said frame assembly, a rear wheel sleeved rigidly on said rear shaft under said seat, two rear crank arms secured to two ends of said rear shaft, and two pedals respectively carried on said rear crank arms;
an intermediate wheel assembly including an intermediate shaft journalled on said frame assembly between said front wheel assembly and said rear wheel assembly, a hand-driven wheel sleeved rotatably on said intermediate shaft, an endless first driving element trained between said front wheel and said hand-driven wheel so as to transfer rotation of said front wheel to said hand-driven wheel, a first clutch means for locking said hand-driven wheel on said intermediate shaft when said hand-driven wheel rotates in a predetermined direction, a foot-driven wheel sleeved rotatably on said intermediate shaft, an endless second driving element trained between said rear wheel and said foot-driven wheel so as to transfer rotation of said rear wheel to said foot-driven wheel, a second clutch means

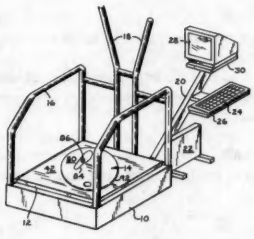
for locking said foot-driven wheel on said intermediate shaft when said foot-driven wheel rotates in said predetermined direction; and

a resistance generating device including a resistance setting device disposed on said frame assembly, a driving wheel sleeved rigidly on said intermediate shaft, and a magnetic controller which includes a rotating shaft journalled on said frame assembly, an input wheel sleeved rigidly on said rotating shaft, an endless third driving element trained between said driving wheel of said intermediate wheel assembly and said input wheel so as to transfer rotation of said driving wheel to said input wheel, and a generator connected functionally to said rotating shaft and said resistance setting device, said generator creating current when said rotating shaft rotates, in such a manner that the higher rotational speed of said rotating shaft, the greater said current created from said generator, said resistance setting device feeding back a signal to said generator in response to changes in said current created by said generator so as to create magnetic resistance to rotation of said rotating shaft, in such a manner that the greater said current created from said generator, the greater said magnetic resistance to rotation of said rotating shaft.

4,986,534
COMPUTERIZED BIOMECHANICAL ANALYSIS SYSTEM

Robert H. Meier, Ann Arbor; Jerry E. Seel, and Gary W. Gray, both of Adrian, all of Mich., assignors to Camp International, Inc., Jackson, Mich.

Filed Jan. 2, 1990, Ser. No. 459,970
Int. Cl.[5] A63B *23/08, 23/10, 22/14*
U.S. Cl. 272—96 **24 Claims**



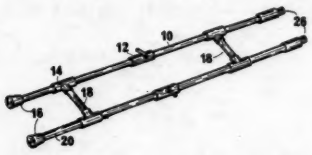
11. A biomechanical analyzing system for the lower limb comprising, in combination, a frame, a foot support, universal support means maintaining said foot support upon said frame for universal movement about a vertical axis, weight sensing means mounted on said frame sensing the amount of weight imposed by said foot support on said frame and the angular location of the imposed weight relative to said axis and having a data output, and recording means recording said data output to permit the analysis of weight distribution relative to said axis.

4,986,535
VARIABLE WEIGHT EXERCISE DEVICE

Harold L. Hull, 401 Canyon Way, Sp. 43, Sparks, Nev. 89434, and Dennis J. Waite, 2245 Hedgewood Dr., Reno, Nev. 89509

Filed Sep. 14, 1989, Ser. No. 407,210
Int. Cl.[5] A63B *21/06*
U.S. Cl. 272—117 **11 Claims**

1. A therapeutic and exercise device comprising: two primary hollow parallel members, said members being joined together near their extremities with two secondary hollow cross members, said primary members and said secondary members forming substantially a two step ladder, said ladder having a first end and a second end, said ladder being partially filled with a viscous fluid, said primary members having valve means located substantially near their center portions, said valve means controlling the rate of flow of said fluid from said

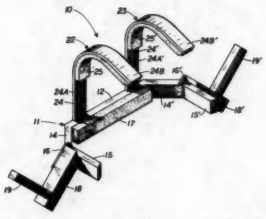


first end of said ladder to aid second end of said ladder and said valve means controlling the rate of flow of said fluid from said second end of said ladder to said first end of said ladder, and said primary members having end caps, said caps being capable of sealing said fluid into said ladder.

4,986,536
LEG EXERCISER

Frank Zane, P.O. Box 2031, Palm Springs, Calif. 92263

Filed Dec. 20, 1989, Ser. No. 453,691
Int. Cl.[5] A63B *21/072*
U.S. Cl. 272—123 **17 Claims**



1. A weight-training device to be placed on the shoulders of a weight lifter, which weight lifter has shoulders, arms a front, two sides, and a back, which device comprises:

a main body portion adapted to be positioned across the front of the body of a weight lifter and below the shoulders, which main body portion has a front bar and rearwardly and outwardly extending side members on opposite sides of said front bar and which portion is open at the back;

a pair of shoulder braces attached to said front bar at spaced locations and extending upwardly therefrom;

a pair of angled members rigidly attached to said main body, said angled members depending downwardly at about a 45 degree angle; and,

weight holding means attached to said angled members.

4,986,537
SIDEWINDER EXERCISER

Frank D'Orta, 69 Molle St., W. Babylon, N.Y. 11704

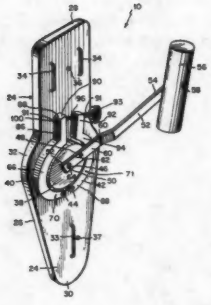
Filed Jan. 22, 1990, Ser. No. 468,018
Int. Cl.[5] A63B *21/015*
U.S. Cl. 272—132 **15 Claims**

1. An exerciser for a user, comprising:

(a) a main body, said main body includes a main frame, a top portion, a bottom portion, and an intermediate portion, said intermediate portion, said bottom portion contains a single lower belt rung and a second lock pin, said single lower belt rung is steel, contains a round disk, a first

caliper half, a second caliper half, and a pair of anchor screws and nuts, said round disk contains a first throughbore and a second throughbore;

(b) means for attaching said main body to the user so that the user can exercise inconspicuously, said top portion contains a pair of upper belt rungs and a first lock pin, said pair of upper belt rungs are steel, said attaching means



include an upper belt with a first upper buckle, a first lower belt with a first lower buckle, and a second lower belt with a second lower buckle so that the exerciser is fitted snugly to the user for inconspicuous use; and

(c) an "S"-shape bar having a free end at which said "S"-shaped bar is pivotally connected to a crank handle which is gripped by the user.

4,986,538

MULTI-STATION EXERCISE MACHINE WITH MULTI-EXERCISE PRESS STATION

Arthur B. Ish, III, Redmond, Wash., assignor to Vectra Fitness, Inc., Redmond, Wash.

Filed Aug. 25, 1989, Ser. No. 398,787
Int. Cl.[5] A63B *21/00*
U.S. Cl. 272—134 **20 Claims**

1. An exercise station comprising;

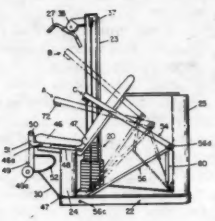
a support frame;

an exercise station;

a swing frame at said exercise station carried by said support frame, said swing frame having handles and a swing axis which is free to move on a predetermined travel path;

means defining said travel path; and

biasing means carried by said support frame and connected to said swing frame at a leveraging location spaced from said swing axis for resisting swinging movement of said swing frame relative to said swing axis and for also resisting movement of said swing axis along said travel path



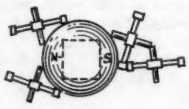
when press exercises are performed by a person gripping said handles at said exercise station.

4,986,539

MAGNETIC BALL AND JACK SET

Walter L. Jackson, 8830 Ellsworth Cir., Santee, Calif. 92071

Filed Jun. 16, 1989, Ser. No. 367,248
Int. Cl.[5] A63F *9/07*
U.S. Cl. 273—1 GD **9 Claims**



1. A magnetically coupled ball and jack set comprising:

(a) A resilient ball incorporating magnetic means;

(b) A plurality of jacks;

(c) Each of said jacks comprising three substantially mutually orthogonal crossbars joined at one another at their centers; and,

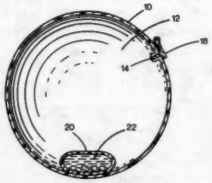
(d) At least one of said crossbars being ferromagnetic in character such that said jacks will cluster around and cling to said ball to facilitate grouping said ball and jacks when not in use.

4,986,540

ERRATICALLY MOVABLE INFLATED GAME BALL

William O. Leslie, P.O. Box 88, Troutlake, Wash. 98650

Filed Apr. 20, 1990, Ser. No. 514,300
Int. Cl.[5] A63B *43/04, 41/00, 45/00*
U.S. Cl. 273—58 H **4 Claims**



1. An erratically movable game device comprising:

a hollow ball; and

a relatively small mass enclosed within the ball, the mass comprising a flexible bladder containing a liquid such that when the device is rolled or projected through the air, the bladder as a whole moves around inside the ball and changes shape as it moves, the movement and changing of

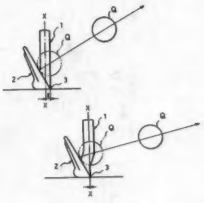
shape of the bladder causing the device to travel erratically.

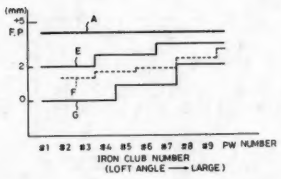
4,986,541

IRON GOLF CLUB SET

Mitsutake Teramoto, Kamakura; Shinkichi Saito, Tokyo; Takaharu Okumoto, Chigasaki, and Hideyo Asabuki, Tokyo, all of Japan, assignors to The Yokohama Rubber Co., Ltd., Tokyo, Japan

Filed May 5, 1989, Ser. No. 347,688
Claims priority, application Japan, May 9, 1988, 63-60127[U]
Int. Cl.[5] A63B *53/04*
U.S. Cl. 273—77 A 3 Claims





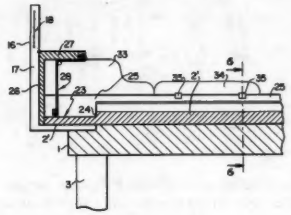
1. A set of iron golf clubs which comprises a plurality of progressively numbered iron clubs, each of said clubs having a shaft and a head having a face which is inclined rearwardly with respect to the vertical axis of the shaft in the direction of the movement of the head when the club is swung and having a bottom leading edge, the angle of the face with respect to the vertical axis increasing with an increase in the progressive numbering of said plurality of golf clubs, each of said clubs having a face progression value, which is the distance between the vertical axis of the shaft of the club and the bottom leading edge of the face, said plurality of golf clubs in the set being divided into a plurality of groups according to their lengths with each of the groups containing progressively numbered golf clubs, wherein all of the golf clubs in anyone group have the same face progression value while the value of the face progression between the groups increases in the groups as the golf club numbers increase.

4,986,542

GAME BOARD FOR PRACTICING ASPECTS OF BOWLS, BILLIARD AND PETANQUE

Jean Bonnet, Tocane-Saint-Apre, France, assignor to Societe des Jeux d'Aquitaine, France

Filed Mar. 28, 1988, Ser. No. 173,817
Claims priority, application France, Mar. 27, 1987, 87 04445; Jan. 28, 1988, 88 01145
Int. Cl.[5] A63D *3/00, 15/06*
U.S. Cl. 273—118 R 17 Claims



1. A special game board for the practice of game of bowls, associating some aspects of the games of billiards and of petanque comprising: a rectangular horizontal plate mounted on legs;

laterals bands or banks connected to lateral sides and protruding above the plate;

a resilient padding material attached to at least one lateral band;

a trough for recovering bowls arranged at an end of said plate; a quadrangular area of game marked in a portion of said board provided with said trough;

a resilient material substantially covering said plate to absorb shocks and noise while allowing bowls to run; and

means for absorbing shock and noise arranged in said trough;

wherein said plate is a composite structure comprising a lower plate of approximately thirty millimeters thickness, made from agglomerated flax processed at high temperature with a resin, and said resilient material is a high density cork plate, approximately four millimeters thick which is in turn covered with felt approximately five millimeters thick.

4,986,543

SINGLE AND/OR DOUBLE PLAYER PINBALL MACHINE

Earl A. Heller, Hopi Trail, R.D. 5, Box 17, Oak Ridge, N.J. 07438

Filed Dec. 13, 1989, Ser. No. 450,087
Int. Cl.[5] A63F *7/00*
U.S. Cl. 273—121 A 5 Claims

1. A dual pinball machine comprising:

a first playing field and a second playing field positioned at an angle to one another, said fields being joined on one side towards the end portions thereof,

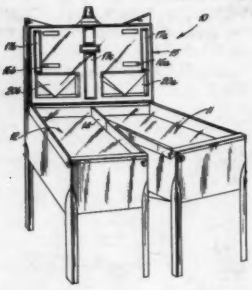
a retractable barrier separating the fields at their juncture,

a vertical scoreboard mounted at the end of the playing fields wherein the fields are joined together, and,

means for raising the barrier to exclude playing on both

fields simultaneously or for lowering the barrier to permit playing on both fields simultaneously,

one or more flippers on each playing field, and



means for shifting control of the flippers on one field to the opposite field under predetermined conditions.

4,986,544

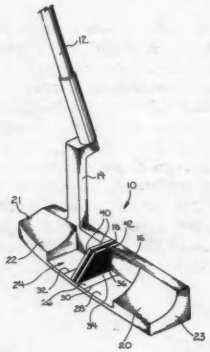
GOLF PUTTER

Glenn S. Benson, 19509 Pasadena, South Bend, Ind. 46614

Filed May 11, 1990, Ser. No. 521,905

Int. Cl.[5] A63B *53/04, 69/06*

U.S. Cl. 273—183 D **4 Claims**



1. In a golf putter including a shaft, and a clubhead having a ball-striking face attached to an end of said shaft, said club head defining a flange extending rearwardly of said ball-striking face, the improvement wherein said flange includes a horizontal strip of a first color oriented along an intended target line and positioned adjacent a sweetspot of said ball-striking face, and a vertically oriented block of a narrower width than the width of said strip, said block having sides of a second color contrasting said first color and positioned substantially along the center of said strip to provide a visual indicator of proper eye and putter positioning when viewed from above the putter.

4,986,545

GOLF BALL COMPOSITIONS

Michael J. Sullivan, Chicopee, Mass., assignor to Spalding Sports Worldwide, Tampa, Fla.

Filed Dec. 13, 1989, Ser. No. 449,774

Int. Cl.[5] A63B *37/12*

U.S. Cl. 273—235 R **4 Claims**

1. A golf ball comprising a core and a cover, wherein the cover is formed from a composition comprising from about 5 to about 50 parts by weight of a maleic anhydride modified copolymer and from about 95 to about 50 parts by weight of an ionomeric resin based on 100 parts by weight of the composition, wherein said maleic anhydride copolymer consists of a copolymer selected from the group consisting of a maleic anhydride modified ethylene-propylene copolymer and a maleic anhydride modified styrenic block polymer, and wherein said ionomeric resin is an ionic copolymer of an olefin and a metal salt of an unsaturated carboxylic acid.

4,986,546

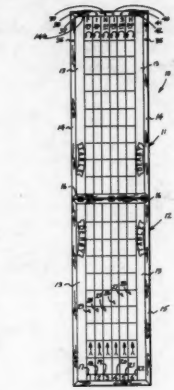
HORSE RACING BOARD GAME

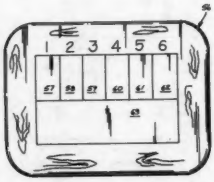
Frederick A. Cerulla, 2135 Tenth St. S., Wyandotte, Mich. 48192

Filed Feb. 26, 1990, Ser. No. 484,994

Int. Cl.[5] A63F *3/00*

U.S. Cl. 273—240 **1 Claim**





1. A horse racing board game apparatus including

an elongate game board including a first game board member and a second game board member, each first and second game board member longitudinally aligned relative to one another and of an equal configuration relative to one another, each first and second game board member hingedly mounted relative to one another at a lower end of the first game board member at an upper end of the second game board member,

the game board including a series of six starting positions longitudinally aligned with a lowermost edge of the first game board member, and

six linear tracks longitudinally aligned relative to each starting position, and wherein each linear track is aligned relative to one another in a parallel relationship, with each linear track terminating in a turn and a finish square, and each turn and finish square including a lap marker bore mounted within the first game board adjacent each turn

and finish square for indication of a completion of a first traverse of each linear track from each respective starting position to each turn and finish square, and

a series of six tokens of contrasting coloration positionable within each respective starting position, and each starting position of a like coloration relative to each token, and

further including three dice, wherein two dice are of a first coloration and the third die is of a third coloration, wherein the first two dice indicate which of the variously colored tokens are to be positioned along each linear track, and the third die is formed with indicia to indicate a predetermined number of positions along each linear track to be traversed, and

wherein each linear track includes ten spaces aligned in the second game board originating from each respective starting position, with nine additional spaces aligned with the ten spaces, wherein the nine spaces are aligned with the ten spaces, whereing the nine spaces are aligned in the first game board, and the turn and finish square is mounted and positioned within each terminal end of the nine respective spaces of each of the six linear tracks, and

further including a flag marker bore mounted in alignment with the turn and finish squares and arranged to selectively receive a flag therewithin, wherein each flag includes an elongate rod with a flag at an upper end and a pointed lower end to be slidably received within each bore, and

wherein each lap marker is initially mounted within an elongate support bar, the support bar including spaced channel members directed upwardly and orthogonally thereof for convenient transport of the support bar, the support bar includes six aligned support bar bores to receive the markers therewithin, and

wherein each player is awarded a predetermined number of betting tokens, and each player is further awarded a chalk board organization, each chalk board organization including a chalk board surface, a chalk writing implement, and a chalk eraser, and

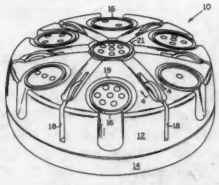
wherein a series of six arrays of contrasting colored wagering tickets are provided to award each player upon each player wagering utilizing the chip tokens, and a game blackboard defined by a central writing surface, wherein the central writing surface includes six columns directed downwardly to a medial portion of the writing surface, with each column corresponding to the six tokens for arbitrarily writing down the betting odds of each token and for indicating the wagering awarded each token, and an information space underlying the columns for indication of wagering totals effected by the players.

4,986,547

GAME APPARATUS

Sandor Zarnoti, P.O. Box 1256, Marathon, Fla. 33050

Filed May 11, 1989, Ser. No. 350,842
Int. Cl.[5] A63F *3/00*
U.S. Cl. 273—241 **10 Claims**



1. A game apparatus comprising:

a plurality of games pieces;

a cover member having a generally horizontal and upwardly facing playing surface that is presented to a player when said apparatus is used and placed on a substantially flat, horizontal surface, said cover member having a plurality of receptacles formed therein for receiving said game pieces, said plurality of receptacles comprising:

receptacles of a first configuration defining a narrow elongated opening vertically oriented relative to said playing surface and situated peripherally about said playing surface for receiving, maintaining, and partially concealing one of said game pieces therein in a generally vertical orientation relative to said playing surface;

receptacles of a second configuration defining a substantially horizontal, game piece shaped recess in said playing surface for receiving, maintaining, and displaying one of said game pieces therein in a generally horizontal orientation relative to said playing surface, said receptacles of said second configuration being situated peripherally about said playing surface adjacent to said receptacles of said first configuration;

a receptacle of a third configuration defining a single, substantially horizontal, game piece shaped recess in said playing surface for receiving, maintaining, and displaying one of said game pieces therein in a generally horizontal orientation relative to said playing surface, said receptacle of said third configuration being situated near the center of said playing surface; and

a base member removably attachable to an underside of said cover member, said base member, in conjunction with said cover member, defining a closed space for retaining said game pieces when said game apparatus is not in use.

4,986,548

BODY BALL TAG GAME

Dock L. Conner, 59 Devon Ct., Apt. 2, Edwardsville, Ill. 62025

Filed Sep. 1, 1989, Ser. No. 401,771
Int. Cl.[5] A63B *67/00*
U.S. Cl. 273—346 **5 Claims**

1. A ball tag game apparatus, comprising:

(a) a ball having a flexible VELCRO pad jacket;

(b) an apron having a front section covering a player's chest from his shoulders to his waist and at least one back section covering a player's back from his shoulders to his waist, each section having a VELCRO hook target area on the outside thereof, wherein said target area comprises an X-pattern of slightly arched VELCRO hook material;

(c) a pair of front tie-down string one attached to each side of said front section and a pair of back tie-down strings one attached to each side of said back section, whereby said apron may be secured in place about a player's torso;

whereby said ball may be thrown at and stuck to said target.

4,986,549

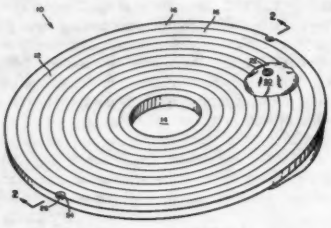
TOSS GAME WITH TARGET COMPARTMENT AREAS

Charles E. Kuhtic, 201 River St., #12, and John A. McSwieney, 201 River St., #46, both of, Troy, N.Y. 12180

Filed Jun. 11, 1990, Ser. No. 535,583
Int. Cl.[5] A63B *63/00, 67/00*
U.S. Cl. 273—402 **5 Claims**

1. A bean bag type toss game with combined storage comprising:

a pair of nestable target boards each of said target boards having a top surface with a plurality of sections of predetermined value and a centrally located opening through the board, each board having a bottom surface and supports protruding outwardly from said bottom surface, said supports varying in size for angling the target board when placed in an upright position, said supports resting on a



play surface and the top surface of the target board facing upwardly, said supports forming the boundary of a recess area on the bottom surface of each board, the bottom surfaces of said boards nesting with each other to nest together such that the boundary forming supports of each target abut each other creating an enclosed storage compartment for the storage of game pieces; and

means for securing the boards together for storage.

4,986,550

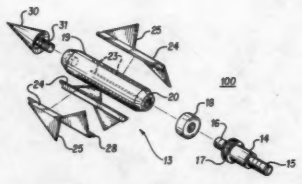
BROADHEAD ARROW

Jose F. Segovia, P.O. Box 2794, Laredo, Tex. 78040

Filed Apr. 19, 1990, Ser. No. 511,048

Int. Cl.[5] F42B *6/08*

U.S. Cl. 273—422 **11 Claims**



7. A multi-stage bladed broadhead arrow including:

an elongated shaft;

an arrowhead attached to one end of said elongated shaft, including a cylindrical body portion having a front end and rear end, said rear end joining to said elongated shaft;

a conical tip attached to said front end to provide a point for said arrow;

a plurality of planar blades,

said blades further comprising a front band of blades encircling said body portion proximal said front end, and a rear band of blades encircling said body portion distal said front end,

each of said blades defining a blade plane,

each one of said blade planes defined by one of said blades of said front bend, together with another one of said blade planes defined by one of said blades of said rear band, forming a pair of intersecting blade planes,

said intersecting blade planes adapted together with said blades to provide overlapping cuts, whereby

as the arrowhead penetrates a target the front band of blades initially makes a series of cuts, and the rear band of blades sequentially makes another series of cuts, the cuts overlapping to define an aperture through the target.

4,986,551

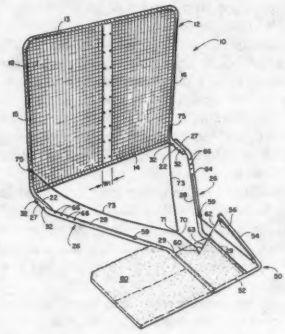
PORTABLE GOLF PRACTICE SWING ASSEMBLY

Jean C. Langlois, 7515 Charmant Dr., #1401, San Diego, Calif. 02122; Gary Dubie, 9823 Pacific Heights Blvd., #T, San Diego, Calif. 92121, and Aleksandar Ratajac, 1333 Thomas Ave., Apt. 16, San Diego, Calif. 92109

Filed May 7, 1990, Ser. No. 519,745

Int. Cl.[5] A63B *69/36*

U.S. Cl. 273—182 R **9 Claims**



1. A portable golf practice swing assembly comprising:

an upright oriented primary frame assembly having a predetermined height, a predetermined width and a front end, a net stretched across said frame assembly and being secured thereto, said net functioning to absorb the foreword momentum and to restrict the forward travel of a golf ball that has been driven into the front end of said primary frame assembly;

a golf ball support structure positioned a predetermined distance from the front end of said primary frame assembly;

a secondary frame assembly connected between said primary frame assembly and said golf ball support structure, said secondary frame assembly functioning to keep said two structures rigidly positioned a predetermined distance from each other;

a golf ball having a front half and a rear half, said golf ball being freely positioned on said golf gall support structure;

a first restraint line having a front end and a rear end, said front end being secured to said golf ball and said rear end being secured to a fixed stationary structure, at least a portion of said first restraint line is formed of an elastic shock cord; and

a second restraint line having a front end and a rear end, said front end being secured to said golf ball, said rear end being connected to tether means that is connected to said primary frame assembly.

4,986,552

EXCLUDER TYPE SEAL WITH SLIDING FRICTION REDUCING FEATURE

Kaoru Anzue, Nihonmatsu; Jun Isomoto, and Nobuo Takei, both of Kyoto, all of Japan, assignors to NOK Corporation and Mitsubishi Jidosha Kogyo Kabushiki Kaisha, both of, Japan

Filed Jun. 7, 1989, Ser. No. 362,795

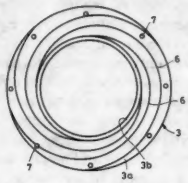
Claims priority, application Japan, Jun. 14, 1988, 63-78534[U]

Int. Cl.[5] F16J *15/32, 15/34, 15/40*

U.S. Cl. 277—38 **13 Claims**

1. A sealing assembly which is to be provided between a stationary part and a rotary shaft which extends through said stationary part, so as to form a seal in a gap between said stationary part and said rotary shaft to prevent the ingress of a fluid, said sealing assembly comprising: a slinger capable of

rotating as a unit with said rotary shaft; and a rubber seal having a lip which makes a sliding contact with said slinger; wherein the portion of said slinger contacted by said lip of said

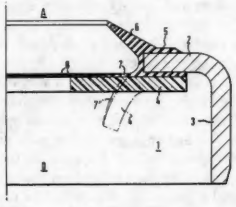


rubber seal is provided with apertures which allow a lubricating flow of said fluid into the region of the sliding contact between said lip of said rubber seal and said portion of said slinger.

4,986,553
SHAFT SEAL

Stuart Preston, Morpeth; Robert Holloran, Whitley Bay, and Brian Lidgate, Killingworth, all of United Kingdom, assignors to George Angus & Company Limited, Newcastle-upon-Tyne, England

PCT No. PCT/GB87/00705, § 371 Date Apr. 7, 1989, § 102(e) Date Apr. 7, 1989, PCT Pub. No. WO88/02454, PCT Pub. Date Apr. 7, 1988
PCT Filed Oct. 5, 1987, Ser. No. 346,947
Claims priority, application United Kingdom, Oct. 6, 1986, 8623930
Int. Cl.[5] F16J *15/32*
U.S. Cl. 277—152 **9 Claims**



1. A shaft seal having an air side and an oil side and comprising a rigid case ring (1) and a resiliently deformable sealing ring for forming a wiping seal, said sealing ring being secured to the case ring and having two annular components (4, 5), one component being an annulus (4) of fluorocarbon resin material and the other component (5) being of elastomeric material, the improvement wherein the elastomeric component (5) extends in a bonded layer (7) over the air side face of the fluorocarbon component to the sealing periphery (15) thereof and forms the wiping seal.

4,986,554
TETHER FOR A DRILL CHUCK KEY

Gordon G. Rathbun, 825 S. Logan, Moscow, Id. 83843

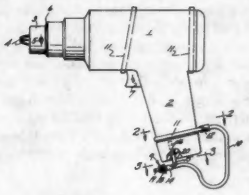
Filed Jul. 25, 1988, Ser. No. 223,951
Int. Cl.[5] B23B *31/06*
U.S. Cl. 279—1 K **3 Claims**

1. A tethering means for a drill chuck key having a handle, said tethering means for looped attachment to a hand held power drill, said tethering means comprising,

tubing of elastomeric material,

said tubing having a first end segment defining a single lateral opening in the tube wall,

said tubing reversed and routed through said lateral opening and into said first end segment and therethrough in concentric fashion to form a loop in said tubing for securing the tubing to the power drill, and

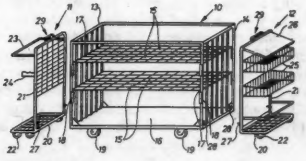


a second end segment of the tubing adapted to receive and secure an inserted end of the chuck key handle.

4,986,555
CARRIAGE FOR HANDLING LAUNDRY

Gunnar B. Andreen, Lund, Sweden, assignor to Aktiebolaget Electrolux, Stockholm, Sweden

Filed Feb. 26, 1988, Ser. No. 160,513
Claims priority, application Sweden, Mar. 4, 1987, 8700904
Int. Cl.[5] B62B *3/02*
U.S. Cl. 280—47.35 **4 Claims**



2. A combination laundry and cleaning wheeled cart for use in hotels, hospitals and the like comprising a box-like structure having opposite vertical end walls, at least one removable shelf for holding clean linen being supported at opposite ends by said end walls, at least one detachable section, means mounting said detachable section on one of said opposite vertical end walls, said mounting means having attaching means at the lower part of said cart and said section engageable by lifting said detachable section relative to said cart, said means including a rotatable latching member for locking said section to said box-like structure at the upper part of said cart and said section, said latching member having a handle for rotating it so that it engages said cart on the section to thereby lock the section to said cart, said detachable section being adapted for transporting cleaning tools and supplies, whereby after the clean linen has been removed from said shelf the latter is moved to a storing position on said cart thereby permitting said cart to accommodate dirty linen for transport to the laundry.

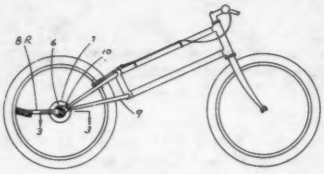
4,986,556
CHAINLESS MOTOCROSS BICYCLE

Dirck T. Hartmann, 4121 Morning Star Dr., Huntington Beach, Calif. 92649

Filed Oct. 10, 1989, Ser. No. 419,480
Int. Cl.[5] B62M *1/08*; F16H *1/28*
U.S. Cl. 280—260 **3 Claims**

1. An improved chainless motocross bicycle including a frame said frame connecting a head tube for a conventional front fork assembly with dropouts on either side of a rear wheel with a central hub; a pedal drive shaft on the axis of said wheel for concentric rotation therewith; pedal crank arms fixed on opposite ends of said pedal drive shaft outboard of said

dropouts; a single ring gear located within said hub with a reduced diameter integral extension of said ring gear extending outboard of said hub; a clamping means for locking said ring gear extension in one of said dropouts; a first angular contact ball bearing located inside said ring gear extension and centering one end of said pedal drive shaft; a second angular contact ball bearing with an inner race of said second bearing seated outside said ring gear extension and an outer race of said second bearing seated inside a first closing plate fixed in one end of said of hub; a single planet gear carrier fixed on said pedal drive shaft for rotation therewith and located inside said ring gear; multiple planet gears rotatably mounted on said planet gear carrier with each of said multiple planet gears in constant



mesh with said ring gear; a single sun gear rotatably mounted on said pedal drive shaft with said sun gear in constant mesh with each of said multiple planet gears; a one way clutch means for driving said hub from said sun gear; a frame interface ball bearing centering the other end of said pedal drive shaft with said clamping means locking outer race of said frame interface bearing in an other of said dropouts; a second closing plate fixed in an other end of said hub; a third angular contact ball ball bearing with an inner race seated against a shoulder on said pedal drive shaft and an outer race threaded into said second hub closing plate for adjusting an axial preload of all three of said angular contact ball bearings; and a locknut threaded on said third bearing outer race and securing said axial preload.

4,986,557

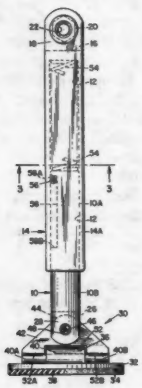
MOTORCYCLE STAND

Richard S. Muszynski, Torrey St., Easthampton, Mass. 01027

Filed Jun. 8, 1989, Ser. No. 363,489

Int. Cl.[5] B62H *1/06*

U.S. Cl. 280—298 **1 Claim**



1. In a kick stand system adapted for use in combination with a motorcycle for holding the motorcycle in a substantially upright support position while the motorcycle is non-operational, the combination of:

a sleeve having a closed upper end and an opened lower end and an inner bore extending from the closed upper end to the open lower end,

the closed upper end of the sleeve being slotted to define a pair of spaced fingers having axially-aligned through openings for accommodating bolting by which the sleeve may be pivotally mounted relative to the motorcycle for swinging movements between a storage position in close adjacency to the motorcycle and an outrigger position in outward angular disposition with respect to the motorcycle,

a slide rod sleeved within the bore for sliding movements with respect to the sleeve and having an outboard extremity extending outwardly of the sleeve,

a lower terminal of the slide rod being slotted to define a pair of spaced fingers having axially-aligned through openings,

a pad assembly including an enlarged ground engaging disc and a resilient padding on the lower face of the disc and a U-shaped bracket integral with the upper face of the disc,

a primary pivot pin extendable within an opening defined between the bracket and the disc and having opposite ends pivotally interrelated with the bracket for facilitating swinging movements of the disc relative to the slide rod,

a tongue fixed at its lower end to the primary pivot pin and extendable away therefrom and having an apertured upper end receivable within the slot defined by the fingers of the lower terminal of the slide rod,

a second pivot pin extendable through the aligned openings in the fingers of the slide rod and the aperture in the outboard end of the tongue for facilitating the suspension of the tongue from the slide rod in a swinging relationship,

the primary and secondary pivot pins being disposed in right angular relationship as to each other for allowing the pivoting of the disc relative to the slide rod in a pair of directions right angular to each other,

a stop pin extendable in chord-like manner transversely across the bore and having opposite ends secured to the sleeve,

a flat on the slide rod inboard of opposite ends thereof for accommodating the stop pin,

the stop pin and flat cooperating as a stop means in limiting the range of sliding movement of the slide rod relative to the sleeve between opposite positions wherein opposite ends of the flat are engaged by the stop pin,

a compression spring means disposed in the bore between the closed end of the sleeve and an upper terminus of the slide rod and engageable with the slide rod for retracting the slide rod with respect to the sleeve when the stand is pivoted to its storage position.

4,986,558

ATTACHMENT FOR MECHANIC'S CREEPER

Philip W. Morris, 9437 E. Corral, Yuma, Ariz. 85365

Filed Jun. 21, 1989, Ser. No. 369,691

Int. Cl.[5] B25H *5/00;* **B62B** *11/00*

U.S. Cl. 280—32.6 **3 Claims**

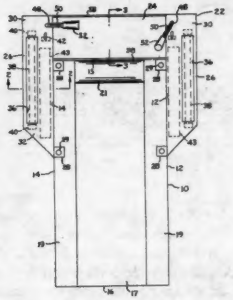
1. An attachment for a floor creeper having a headrest at one of its ends; said attachment comprising a U-shaped wall structure that includes two laterally spaced channels (30) adapted to extend horizontally along opposite side edge areas of a floor creeper, and a third channel (54) extending transversely between said laterally spaced channels at the headrest end of the creeper; each of the laterally spaced channels having a horizontal web wall (32) and two downwardly extending flanges; said third channel including a web wall (56) and two upwardly extending flanges; said channels being located in a common horizontal plane, and the web walls of the laterally spaced channels being in approximate planar alignment with the upper face of the creeper when the attachment is installed thereon;

spacing between the laterally spaced channels being at least as great as the width of the creeper so that the channels are located outside the plan dimension of the creeper;

an elongated opening in the web wall of each of the laterally

spaced channels; a fluorescent light arranged within each one of the laterally spaced channels directly below the associated opening whereby the fluorescent lights are adapted to illuminate undersurface areas of an automotive vehicle;

and a high intensity light mounted on the web wall of at least one of the laterally spaced channels; each high intensity



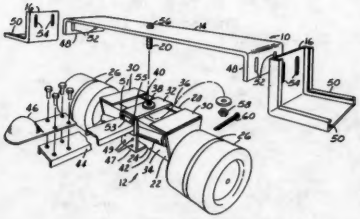
light including a flexible tube means extending upwardly from the associated channel web wall, whereby the high intensity light can be adjusted as to its direction and spacing from the associated web wall; said third channel having opposite ends thereof closed by the laterally spaced channels, whereby said third channel constitutes an upwardly opening tool tray.

4,986,559

TRAILER WHEEL PIVOTING SYSTEM

Richard O. Yaklin, 22514 Stephens, St. Clair Shores, Mich. 48080

Filed Jan. 11, 1989, Ser. No. 296,089
Int. Cl.[5] B60P *3/06*
U.S. Cl. 280—402 **6 Claims**



1. A tow trailer incorporating a trailer wheel pivoting system, said tow trailer comprising:

a wheel assembly frame, said wheel assembly frame having an upper end and a lower end, said wheel assembly having an attitude relative to level ground;

an axle connected to said wheel assembly frame adjacent said lower end thereof, said axle having a first end and a second end, said axle being structured to permit mounting of at least one road wheel at each of said first and second ends thereof;

a pair of road wheels located at each of said first end and said second end of said axle for supporting the tow trailer on a surface, each said pair of road wheels having a predetermined diameter, a predetermined distance being defined between said pair of road wheels at said first end of said axle and said pair of road wheels at said second end of said axle;

a cross-bar connected to said upper end of said wheel assembly frame, said cross-bar having an aperture at a central location thereof, said location being defined by an imaginary line being drawn perpendicularly from said cross-bar to said axle;

tow bar means for hitching said wheel assembly frame to a tow vehicle, said tow bar means being connected to said wheel assembly frame;

height adjustment means for selectively varying where said tow bar means attaches to said wheel assembly frame so as to selectively vary said attitude of said wheel assembly frame when said tow bar means is hitched to said tow vehicle;

an elongate trailer frame located on said wheel assembly frame adjacent said cross-bar, said elongate trailer frame having an aperture which is coincidently aligned with said aperture on said cross-bar, said elongate trailer frame having a first end and a second end, said first end and said second end of said elongate trailer frame being separated by a distance greater than said predetermined distance;

a flange located at each of said first and second ends of said elongate trailer frame, each said flange projecting perpendicularly from a side of said elongate trailer frame;

a cradle connected with each said perpendicular flange, each said cradle including a portion which is structured to hold a vehicle wheel, each said cradle being located a selected distance from said surface; and

pivot pin means for pivotally holding together said wheel assembly frame with said trailer frame, said pivot pin means extending through both of said apertures in said cross-bar and said trailer frame; said elongate trailer frame being pivotable about said pivot pin means relative to said wheel assembly frame even where each said cradle is selected to be located closer to said surface than a distance defined by said predetermined diameter of each said pair of road wheels,

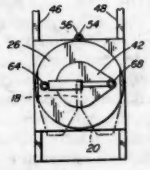
wherein said wheel assembly frame and said cross-bar constitute a wheel assembly structure; said wheel assembly structure having a secondary aperture; said elongate trailer frame having a secondary aperture coincidently alignable with said secondary aperture on said wheel assembly structure; said tow trailer further comprising pivot stop means for inserting into said secondary apertures and thereby preventing said elongate trailer frame from pivoting about said pivot pin means relative to said wheel assembly structure.

4,986,560

ANTI-JACKKNIFING DEVICE FOR ARTICULATED ROAD VEHICLES

Jean P. Tambay, 888 Roseview Ave., Ottawa, Ontario, Canada K2B 6J4

Filed Apr. 18, 1989, Ser. No. 340,076
Int. Cl.[5] B62D *53/08*
U.S. Cl. 280—432 **16 Claims**



1. An anti-jackknifing coupling device for an articulated vehicle comprising a tractor-trailer combination, comprising a base member having means for mounting said base member upon said tractor, a member rotatably mounted upon said base member, a trailer support member adapted to releasably couple

said trailer, said trailer support member being supported upon, and rotatable with, said rotatably mounted member, and a piston-and-cylinder device connected between said trailer support member and said base member, said piston-and-cylinder device extending substantially diametrically across said rotatably mounted member when said base member and said rotatable member are in a position corresponding to alignment of said tractor-trailer combination, the arrangement being such that rotation of said trailer support member and rotatably mounted member relative to said base member contracts said piston-and-cylinder device, said coupling device further comprising means for inhibiting contraction of said piston-and-cylinder means.

4,986,561

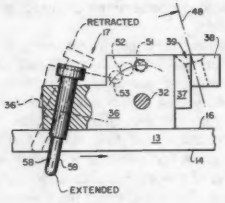
METHOD AND APPARATUS FOR SPEED AND MANEUVERABILITY CONTROL FOR DOWNHILL SKIING

John M. Humphrey, Monte Sereno, Calif., assignor to Humphrey Engineering, Inc., Monte Sereno, Calif.

Continuation of Ser. No. 126,211, Nov. 27, 1987, abandoned. This application Jun. 27, 1990, Ser. No. 544,051

Int. Cl.[5] A63C *5/06*

U.S. Cl. 280—605 **13 Claims**



1. A ski control assembly for use with a downhill snow ski having an elongated body defined by an upper skier support surface, a lower snow engaging running surface and spaced lateral side edge surfaces, and having a ski boot attachment toe piece fixed on said upper skier support surface, said ski control assembly comprising:

a pair of control surfaces mounted on said downhill ski in the region of the center of pressure of said downhill ski and generally adjacent said toe piece, each of said control surfaces including a cylindrical drag probe disposed adjacent one of said lateral side edge surfaces of said downhill ski, said drag probes of said pair of control surfaces being disposed adjacent opposite ones of said lateral side edge surfaces of said downhill ski;

means for selectively deploying said pair of control surfaces to cause said drag probes to penetrate the snow to enable a downhill skier, through the execution of conventional body movements, to impart auxiliary control forces on said downhill ski as it moves in relation to the snow to provide enhanced control over drag and enhanced maneuverability; and

means for adjustably mounting each of said drag probes of said pair of control surfaces on said ski to penetrate the snow to different depths whereby differential drag forces may be imposed on said downhill ski adjacent opposite ones of said lateral side edge surfaces.

4,986,562

SKI BINDING

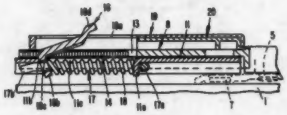
Henry Freisinger, Vienna; Hubert Würther, Hainburg/Donau; Karl Stritzl, and Egon Brunhuber, both of Vienna, all of Austria, assignors to TMC Corporation, Barr/Zug, Switzerland

Filed Jun. 6, 1989, Ser. No. 362,181

Claims priority, application Austria, Jun. 9, 1988, 1503/88

Int. Cl.[5] A63C *9/00*

U.S. Cl. 280—633 **8 Claims**



1. A device for the longitudinal displacement of ski binding parts on a ski, the device comprising:

a guide plate having a longitudinal recess disposed therein, said recess including teeth disposed on a side thereof,

a sled mounted on said guide plate for slidable movement in the longitudinal direction of the ski, the sled having a toe unit disposed on a front end thereof and an angle piece extending in a direction toward the ski;

a pivotable insertion piece having a portion disposed to pivot into and out of said recess, said insertion piece having teeth for selective engagement with the teeth of said guide plate, said insertion piece having a transverse ling disposed at one end thereof; and

a substantially U-shaped wire yoke having two arms, each arm passing through slots in the insertion piece and having a spring disposed thereon, said yoke extending between and connecting said angle piece of said sled and said transverse link of said insertion piece, said springs exerting force therebetween.

4,986,563

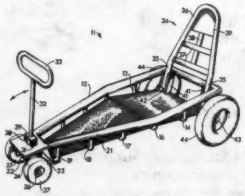
EMERGENCY HAND TRUCK

Fred W. Grant, 3177 Terrace Ct., Apt. H, Norcross, Ga. 30092

Filed Jul. 21, 1989, Ser. No. 382,981

Int. Cl.[5] A61G *1/02*

U.S. Cl. 280—640 **9 Claims**



1. An emergency hand truck comprising, in combination

an elongated frame member having a front portion, a rear portion, and opposed side members extending along the length of said frame member,

a support bed depending from said frame member, said support bed comprising an array of transverse support members arranged along the length of said frame member and each extending across said frame member and attached at its end portions to said opposed side members and depending from said opposed side members,

individual ones of said transverse support members extending at progressively greater distances from said frame member along the length of said frame member from an

intermediate position of said frame member toward the front portion and toward the rear portion of said frame member

a bed surface overlying and supported by said transverse support members, said bed surface extending at downwardly sloped angles from the intermediate position of said frame member toward the front portion and toward the rear portion of said frame member

an adjustable back member mounted adjacent the rear of said truck,

first wheel means mounted at the rear portion of said frame member outside of said frame member at the sides thereof, and extending above said frame member,

second wheel means swivelly mounted to the front portion of said frame member at a location forward of said support bed, and

means for steering said truck by swivelling said second wheel means.

4,986,564

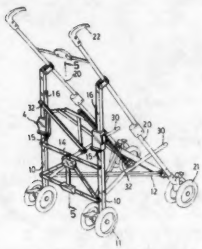
ADJUSTABLE MECHANISM FOR A SEAT BACK OF A STROLLER

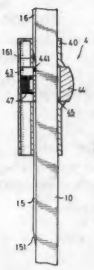
Dong-Shuei Liu, No. 1, Sec. 3, Chung Shan Rd., Tan Tzu Hsiang, Taichung Hsien, Taiwan

Filed Mar. 14, 1990, Ser. No. 493,200

Int. Cl.[5] B62B 9/12

U.S. Cl. 280—642 **5 Claims**





1. An adjustable mechanism for a seat back of a stroller, said stroller generally comprising two vertical posts and two inclined posts pivotally connected together at an upper portion thereof, a base portion being connected between a lower portion of said vertical posts and said inclined posts, a frame portion being connected between said lower portion of said vertical posts, a rear end of a bar being pivotally connected to said lower portion of each said vertical post and a substantially intermediate position of said bar being pivotally connected to said lower portion of a respective inclined post, a lower end of a rod being pivotally connected to each said bar between said vertical post and said inclined post; characterized in that said adjustable mechanism comprises at least one stop disposed on an inner surface of each said vertical post, a sleeve having a through hole formed along a longitudinal axis thereof, an opening being formed in a surface of said sleeve, a button having a center hole, said through hole of said sleeve and said center hole of said button being large enough for slidably receiving said vertical post and said stop, a spring element being biased between each said sleeve and a respective button, a lower end of a lever arm being pivotally connected to a lower end of each said sleeve and an upper end of said lever arm being pivotally connected to an upper end of a respective rod; said spring element biases said button forward so that said button is engageable with one said stop and so that said sleeve can not move downward; and said sleeve is freely movable downwards along said vertical post when said button is slightly depressed against said spring element.

4,986,565

WHEEL SUSPENSION SYSTEM FOR VEHICLES

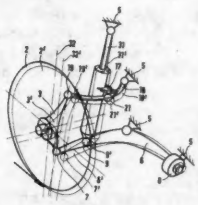
Jenö Hajto, Munich, Fed. Rep. of Germany, assignor to Bayerische Motoren Werke AG, Fed. Rep. of Germany

Filed Dec. 22, 1989, Ser. No. 454,930

Claims priority, application Fed. Rep. of Germany, Dec. 23, 1988, 3843612

Int. Cl.[5] B60G 3/00, 13/08

U.S. Cl. 280—667 **18 Claims**



1. A wheel suspension system for a vehicle comprising:

a wheel carrier carrying a wheel, and

an upper and a lower wishbone respectively pivotably connected to the wheel carrier and with a vehicle body or the like at opposite ends,

wherein a shock absorber tube is connected with its lower end by way of a pivot with the lower wishbone, the upper end of the shock absorber tube 11 supporting itself at the vehicle body or the like, and

wherein the upper wishbone is connected by way of an arm, is connected with the shock absorber tube.

4,986,566

SUSPENDING APPARATUS FOR VEHICLES

Yutaro Nishino, Hamamatsu, and Kihachi Kondoh, Shizuoka, both of Japan, assignors to Suzuki Jidosha Kogyo Kabushiki Kaisha, Shizuoka, Japan

Filed Jul. 25, 1989, Ser. No. 385,909

Claims priority, application Japan, Jul. 29, 1988, 63-189750; Jul. 29, 1988, 63-189749

Int. Cl.[5] B60G 7/00

U.S. Cl. 280—688 **7 Claims**

1. A suspending apparatus for vehicles, comprising:

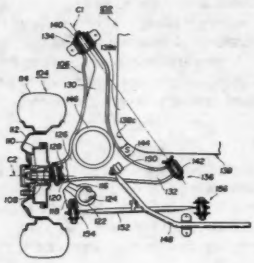
a suspension arm having a wheel-side supporting portion and two vehicle body side supporting portions so as to support a wheel so that the wheel can vertically oscillate relative to a vehicle body;

a first centerline connecting said two vehicle body side supporting portions extending obliquely relative to a second centerline defined by a wheel shaft which supports the wheel such that said first centerline does not perpendicularly cross said second centerline;

said two vehicle body side supporting portions being positioned such that said first centerline passes through a corner portion of a vehicle component;

a side surface of said suspension arm as extending between said two vehicle body side supporting portions formed and positioned so as to extend along the corner portion of the vehicle component while being spaced therefrom and;

said suspension arm including a base plate and a subplate,



said base plate having a substantially C-shaped cross section including opposed side wall portions, in which side edges of the subplate are respectively fixedly attached to free edges of said side wall portions, said subplate being bent inwardly relative to the C-shaped section so that a free edge thereof is disposed between the base plate side wall portions of the suspension arm in order to reduce concentration of stresses in the suspension arm at the free edge of the subplate.

4,986,567

SUSPENSION FOR MOTOR VEHICLES

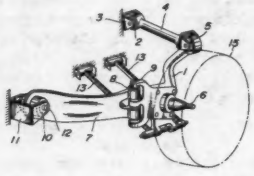
Kanji Kubo, and Keiichi Mitobe, both of Tokyo, Japan, assignors to Honda Giken Kogyo Kabushiki Kaisha, Tokyo, Japan

Filed Sep. 6, 1985, Ser. No. 773,439

Claims priority, application Japan, Sep. 7, 1984, 59-135918[U]

Int. Cl.[5] B60G *7/00*

U.S. Cl. 280—690 **5 Claims**



1. A suspension for use in a motor vehicle having a vehicle frame, comprising:

a knuckle arm for supporting a wheel, said knuckle arm having upper and lower ends;

an upper arm having an end pivotally coupled to the upper end of said knuckle arm and adapted to extend substantially transversely of the vehicle frame;

at least one lower arm having an end pivotally coupled to the lower end of said knuckle arm and adapted to extend substantially transversely of the vehicle frame;

a trailing arm extending substantially longitudinally of the vehicle frame, said trailing arm having one end pivotally connected to the vehicle frame through a resilient bushing and the other end pivotally connected to said knuckle arm through a joint structure; and

said joint structure being constructed so that said trailing arm is swingable relative to said knuckle arm about a vertical axis of the vehicle frame.

4,986,568

VEHICLE SUSPENSION WITH VARIABLE DAMPING

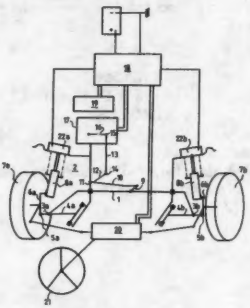
Lucien Galtier, Morsang Sur Orge; Andre Barthelemy, Saint-Remy-Les-Chevreuse, and Roger Herbreteau, Voulogne, all of France, assignors to Automobiles Peugeot and Automobiles Citroen, Neuilly sur Seine, France

Continuation of Ser. No. 288,144, Dec. 22, 1988, abandoned. This application Apr. 30, 1990, Ser. No. 517,387

Claims priority, application France, Dec. 22, 1987, 87-18497

Int. Cl.[5] B60G *11/26*

U.S. Cl. 280—707 **3 Claims**



1. In a suspension for an automotive vehicle having a chassis and a system of damping variable as a function of parameters such as the speed, the height, and steering angle of the wheels, the suspension having suspension arms connected to axles for front wheels of the vehicle, an anti-inclination bar connected to the suspension arms for the front wheels, and actuators for varying the damping of suspension elements connected to the front wheels, the improvement comprising,

a lever secured to the center of the anti-inclination bar to pivot through an angle corresponding to the angular rotation of the center of the bar,

detecting means for detecting the height of the vehicle and comprising a casing mounted on the chassis of the vehicle and having an input arm adapted to be driven in rotation,

means connecting said lever to said input arm to turn said input arm in response to pivoting of said lever,

said detecting means comprising a detector for providing an electrical signal corresponding to the angle of rotation of the center of the anti-inclination bar, and

electronic means for transmitting control information to said actuators in response to an electrical signal from said detector which exceeds a predetermined threshold value.

4,986,569

AIRBAG ATTACHMENT SYSTEM

William J. Bruton, Bellevue, Wash., assignor to Automotive Systems Laboratory, Inc., Farmington Hills, Mich.

Filed Jun. 19, 1989, Ser. No. 367,789

Int. Cl.[5] B60R *21/06*

U.S. Cl. 280—743 **1 Claim**

1. An airbag attachment system for an inflatable vehicle occupant restraint system comprising

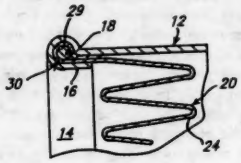
a cannister having an open end defined by spaced sidewalls,

a peripheral edge flange on said cannister having a shoulder extending generally normally and laterally outwardly relative to the sidewalls thereof,

an inflatable airbag disposed within said cannister and having an open end with a channel thereabout, and

a metal rod disposed in the channel of said airbag and seated on the shoulders of said cannister, the edge flange of said

cannister being reentrantly directed toward the interior of said cannister so as to envelop said rod and the channel portion of said airbag so as to retain said rod and airbag on the shoulder of said cannister whereby the inflatable air-



bag is reentrantly directed about the end of the edge flange of said cannister upon inflation of said airbag and deployment thereof outwardly of the open end of said cannister.

4,986,570

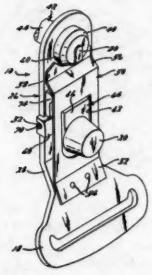
ATTACHMENT MECHANISM

Franz R. Quinting, Rochester Hills, Mich., assignor to Chrysler Corporation, Highland Park, Mich.

Filed Dec. 22, 1989, Ser. No. 455,727

Int. Cl.[5] B60R *22/00*

U.S. Cl. 280—808 **7 Claims**



1. An attachment mechanism comprising a base member having a keyhole opening formed adjacent one end thereof adaptable to mounting around and on a fixed mounting member, connector means formed at the other end thereof, leaf-spring means having one end thereof attached adjacent said other end of said base member, retainer means formed on the distal end of said leaf-spring means adjacent said keyhole opening adaptable to retaining said attachment mechanism on said fixed mounting member, and manually operable actuating means operatively associated with said leafspring means and said base member adaptable to disconnecting said retainer means from said fixed mounting member.

4,986,571

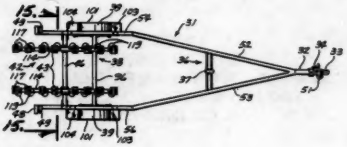
FENDER UNIT FOR USE WITH A BOAT TRAILER OR THE LIKE

Byron L. Godbersen, Lake LaJune Estates, Ida Grove, Iowa 51445

Continuation of Ser. No. 351,603, May 15, 1989, abandoned, which is a continuation of Ser. No. 176,187, Mar. 31, 1988, abandoned, which is a division of Ser. No. 112,476, Oct. 26, 1987, Pat. No. 4,820,111. This application Mar. 19, 1990, Ser. No. 495,327

Int. Cl.[5] B62B *9/16*; B60P *3/10*

U.S. Cl. 280—854 **1 Claim**



1. A fender unit for use with a boat trailer having a pair of transversely spaced frame members interconnected by a wheel and axle unit, including a wheel mounted laterally outside one of said frame members, the fender unit comprising:

a one-piece fender element U-shaped in cross-section to receive in a nested condition, and to embrace a substantial portion of the upper portion of a wheel, and with a top surface arcuate shaped to extend over the upper portion in a concentric manner, said fender element including forwardly and rearwardly extended horizontally disposed flanges, said flanges each including fastening lugs secured to the underside thereof;

means mounting said fender element on an adjacent one of said frame members, said mounting means including a brace element extended below said fastening lugs of each of said flanges;

fastening means connecting said mounting means to said frame member in longitudinally adjustable relation therewith, and further said fastening means connecting each of said brace elements to said fastening lugs such as to be hidden from view from above; and

wherein said flanges have upper surfaces disposed in the same normally horizontal plane with and disposed in longitudinal alignment relative to and parallel the adjacent frame member.

4,986,572

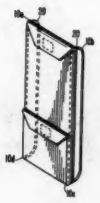
POCKET RECEPTACLES FOR WRITING IMPLEMENTS AND MISCELLANEOUS SMALL ARTICLES

Jon Kuykendall, P.O. Box 20061, Seattle, Wash. 98142

Filed Oct. 10, 1989, Ser. No. 418,866

Int. Cl.[5] B42D *9/00*

U.S. Cl. 281—15.1 **7 Claims**



1. An apparatus comprising:

(a) a substantially rectangular and substantially flat carrier

having a first pair of corners separated by a first edge of said carrier and a second pair of corners separated by a second edge of said carrier, said first and second edges being parallel to one another;

(b) a first elastic cord connected at each of its ends to respective corners of said first pair;

(c) a second elastic cord connected at each of its ends to respective corners of said second pair; and

(d) a first pocket attached to said carrier,

whereby said elastic cords extend respectively along the inside of the front and back covers of a book and next to the book's pages to releasably attach the carrier to the book, and to position the carrier along the spine of the book with said first pocket facing outward.

4,986,573

LAYOUT SHEET

Harry C. Brunhoefer, 5842 Banning Pl., Burke, Va. 22015

Filed May 8, 1990, Ser. No. 520,504

Int. Cl.[5] B42D *15/00*

U.S. Cl. 283—62 **9 Claims**

1. A sheet used for laying out or composing lines of text, art work for subsequent photographic reproduction in the printing and graphic arts industries, in which the sheet has non-photographically reproducible indicia on one side or face thereof to facilitate aligning and positioning of the text, and wherein a dry, transparent, tacky adhesive coating is applied to said one face for securely holding the text in place, and which also enables the text to be removed and repositioned plural times.

4,986,574

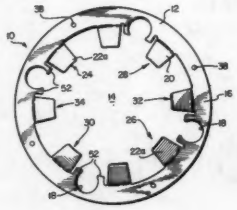
RAISED FACE FLANGE ALIGNMENT TOOL

Gary D. Beckman, Austin, Tex., assignor to Fisher Controls International, Inc., Clayton, Mo.

Filed Jan. 11, 1990, Ser. No. 463,479

Int. Cl.[5] F16L *35/00*

U.S. Cl. 285—24 **7 Claims**



1. For use with a pipeline mounting flange having a raised face flange, an alignment device for self centering two opposing raised face flanges during a fluid pipeline mounting operation in which flange throughbolts pass through respective boltholes in the pipeline mounting flanges and the throughbolts are tightened to move the opposing raised face flanges into a locked mounting position, said alignment device comprising:

a plate with a central aperture sufficient to surround said opposing raised face flanges and having an outer portion and an inner portion defining said central aperture;

the plate outer portion including plate boltholes matching the respective boltholes of the pipeline mounting flanges to position said raised face flanges in opposing alignment;

the plate inner portion including raised spring fingers diverging outwardly from the plate surface and located at opposite positions of said central aperture immediately adjacent said opposing raised face flanges;

said opposite raised spring fingers having an inner diameter slightly larger than the outside diameter of said opposing raised face flanges so that as the throughbolts are tightened the opposing raised face flanges engage said spring fingers and maintain said raised face flanges in alignment and enable self centering alignment during said fluid pipeline mounting operation.

4,986,575

PLASTIC PROTECTIVE TUBE ARRANGEMENT FOR LINES

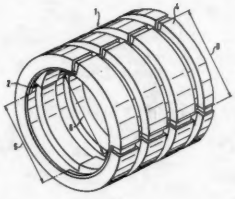
Franz-Josef Braun, Königsberg/Bayern, Fed. Rep. of Germany, assignor to Frankische Rohrwerk Gebr. Kirchner GmbH & Co., Konigsberg, Fed. Rep. of Germany

Filed Nov. 17, 1987, Ser. No. 123,450

Claims priority, application Fed. Rep. of Germany, Nov. 25, 1986, 3640226

Int. Cl.[5] F16L *37/26*

U.S. Cl. 285—325 **9 Claims**

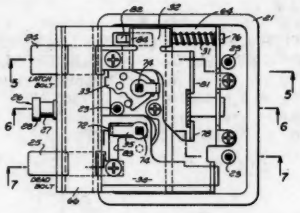


1. A plastic protective tube arrangement for lines and preferably for cable harnesses in motor vehicles comprising a first annular corrugated flexible plastic tube for receiving the lines, said tube having a longitudinal slot defined by longitudinal edges of said first tube for insertion of the lines, wherein a second annular corrugated outer plastic tube having a longitudinal slot therein defined by longitudinal edges of said second tube is provided which is reversibly fitted onto the inner plastic tube from the outside and covers the longitudinal slot thereof, and further wherein said arrangement includes antiturn means disposed on one of said inner and outer tubes for preventing relative rotational motion between said inner and outer tubes wherein said antiturn means includes a projection on one of said inner and outer tubes for engaging edge abutments on longitudinal edges of the other of said inner and outer tubes, said projection having substantially the height of said edge abutments on the other tube engageable therewith.

4,986,576
LOCKING DOOR LATCH

John P. Anderson, Norco, Calif., assignor to The Hartwell Corporation, Placentia, Calif.

Continuation of Ser. No. 291,279, Dec. 27, 1988, abandoned.
This application Apr. 16, 1990, Ser. No. 509,201
Int. Cl.[5] E05C 1/16
U.S. Cl. 292—40 19 Claims

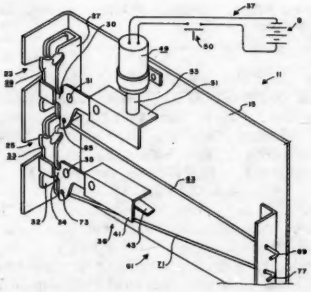


1. In a door latch, the combination of:
a housing;
a latch bolt slidingly carried in said housing;
a dead bolt slidingly carried in said housing;
first control means for moving said latch blot between a door locked position and a door unlocked position;
second control means for moving said dead bolt between a door locked position and a door unlocked position;
with said latch bolt and said dead bolt positioned parallel to each other and sliding along parallel paths, and with said latch bolt and said dead bolt moveable independently of each other;
a center bolt fixed in said housing and projecting outward between said latch bolt and said dead bolt, said center bolt having a center neck of lesser cross-section and an exposed end flange of greater cross-section; and
a strike having spaced openings for receiving said latch bolt and said dead bolt, respectively, and having a slot between said openings for receiving said center bolt neck, with said center bolt flange of greater cross-section than said slot.

4,986,577
SECURITY LOCK MECHANISM

Elon Griffin, Rte. 3, Box 464 A-1, Byhalia, Miss. 38611

Filed Mar. 30, 1989, Ser. No. 330,782
Int. Cl.[5] E05C 9/00
U.S. Cl. 292—48 8 Claims

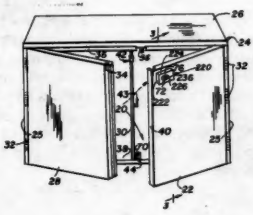


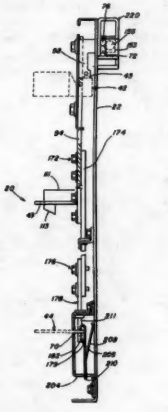
1. A security lock mechanism for locking first and second structures to one another to define a controlled space on one side of said first and second structures and for requiring the simultaneous efforts of two persons to unlock said security lock mechanism from locations outside said controlled space, said lock mechanism comprising:
(a) a first latch member attached to said first structure;
(b) a second latch member attached to said first structure;
(c) first latch means attached to said second structure for being locked to said first latch member;
(d) second latch means attached to said second structure for being locked to said second latch member; and
(e) control means for unlocking said first and second latch means from said first and second latch members; said control means including first control means for being activated from a location adjacent but outside said controlled space and including second control means for being activated from a location remote from said controlled space; said control means unlocking said first and second latch means from said first and second latch members only if said first and second control means are activated simultaneously.

4,986,578
DOOR LATCHING ARRANGEMENT FOR AN ENCLOSURE

Walter J. Hall, Evanston, Ill., assignor to S&C Electric Company, Chicago, Ill.

Filed Oct. 24, 1988, Ser. No. 262,854
Int. Cl.[5] E05B 67/00
U.S. Cl. 292—104 4 Claims





1. A door latching arrangement for latching the door of an enclosure comprising:
a latch member carried by the door and being movable over a range of movement including a latched position;
a first receiver member for said latch member carried by the enclosure and cooperating with said latch member for latching the door;
means for urging said latch member toward a latched posi-

tion in engagement with said first receiver member and for selectively moving said latch member out of said latched position;

means for retaining said latch member in a retained position in a predetermined range of positions and out of said latched position whenever said latch member is moved out of said latched position to an extent to permit opening of the door, said retained position being dependent upon the extent of movement of said latch member;

means for releasing said latch member to be moved by said urging means to said latched position when the door is moved to a closed position;

a first tab member carried by and extending from the enclosure, said first tab member having a first alignment hole, said latch member comprising an elongated latch arm and a second tab member extending therefrom, said second tab member having a second alignment hole, said second tab member being arranged so as to be generally parallel to and adjacent said first tab member with said first and second alignment holes being aligned when the door is in the closed position and said latch member is in said latched position;

a movable blocking member;

a third tab member extending from said blocking member, said third tab member having a third alignment hole and being arranged so that said third tab member is adjacent to and generally parallel to said first and second tab members with said first, second, and third alignment holes being aligned when said door is in the closed position and said latch member is in said latched position; and

means for moving said blocking member at a predetermined position of movement of said latch member, said moving means comprising said blocking member including engageable means for being engaged by said latch member at a predetermined position of movement of said latch member, said latch member engaging said engageable means before said second tab member has moved to a position that is non-blocking with respect to said first and third alignment holes.

4,986,579

DOOR CLOSING DEVICE

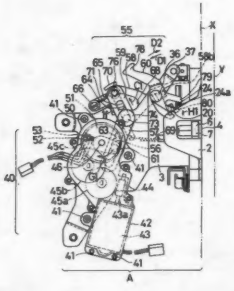
Yoshiaki Ishikawa, Chiryu, Japan, assignor to Aisin Seiki Kabushiki Kaisha, Kariya, Japan

Filed Oct. 2, 1989, Ser. No. 415,768

Claims priority, application Japan, Sep. 30, 1988, 63-248475

Int. Cl.[5] E05C *3/26*

U.S. Cl. 292—201 **6 Claims**



1. A door closing device comprising:

a latch mechanism provided between a door and a body and including a striker secured to the body and a pawl provided with the door;

a driving mechanism; and

a transmitting mechanism includes a first member to be operated by said driving mechanism and a cam lever, a second member engageable with the first member and acting on the pawl for closing the door upon engagement with the first member, and a cancel-lever for releasing the engagement between the first and second members, said second member comprising a push lever and a slide lever, said driving mechanism driving said cam lever to operate said first member and said push lever to move said door from a half-latched condition to a full-latched condition.

4,986,580

LOCK WITH A MECHANISM FOR LOCKING AND UNLOCKING BY MEANS OF AN ELECTROMAGNET

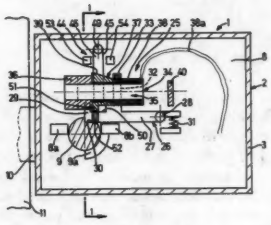
Oscar Llort, 3, rue Pierre Curie, 38100 Grenoble, France

Filed Jan. 23, 1989, Ser. No. 286,948

Claims priority, application France, Mar. 23, 1987, 87 03972

Int. Cl.[5] E05B *3/26*

U.S. Cl. 292—201 **20 Claims**



1. Lock comprising a mechanism for locking and unlocking a member connecting or adapted to connect a handle or other actuation means to at least one latch, said mechanism comprising:

an auxiliary element movable between a first position in which it is engaged with said member and a second position in which it is released from said member,

a return means biasing said auxiliary element toward one of said positions,

an electromagnet comprising a movable element,

a cam and a cam follower, one of said cam and cam follower being carried by the movable element of said electromagnet and the other by said auxiliary element,

said cam and cam follower being adapted to cause said auxiliary element to move from one of its positions to its other position when the movable element of the electromagnet moves from a first position to a second position,

said handle being connected to said member by disengageable means allowing said handle to rotate relative to said member when the torque exerted on it is higher than a specific value.

4,986,581

ELECTROMAGNETIC DOOR LOCK DEVICE

Arthur Geringer, 5029 E. Jacobs Ct., Agoura, Calif. 91301; Richard Geringer, 2663 Riata Ct., Camarillo, Calif. 93010, and David Geringer, 28364 Balkin, Agoura, Calif. 91301

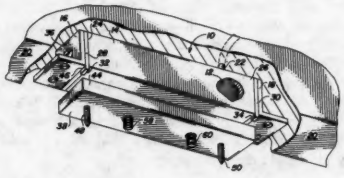
Filed Apr. 16, 1990, Ser. No. 509,453

Int. Cl.[5] E05C *17/56*

U.S. Cl. 292—251.5 **10 Claims**

1. In an electromagnetic door lock device having an electromagnet secured in a housing to the underside of the top of a door frame, a door hinged in said frame for opening and closing, an armature moveably secured to the top of the door below said housing and magnetically attractable up towards said electromagnet to an operative position when the latter is energized, said armature dropping by gravity toward said door frame top to a resting position when said electromagnet is deenergized, and door locking means connected to and depending from said housing which intercepts said armature only

when the latter is in said operative position magnetically attracted to said energized electromagnet, so as to prevent said door from opening, the improvement which comprises means



which biases said armature upwardly toward said operative position so as to reduce the amount of magnetically attractive force needed to move said armature to said operative position.

4,986,582

CLOSURE CONNECTING ROD MECHANISM

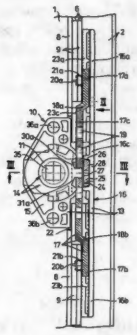
Benno Sting, Netphen, and Gerhard Hartmann, Wilgersdorf, both of Fed. Rep. of Germany, assignors to Siegenia-Frank KG, Siegen, Fed. Rep. of Germany

Filed Oct. 12, 1989, Ser. No. 420,295

Claims priority, application Fed. Rep. of Germany, Oct. 21, 1988, 3835835.2

Int. Cl.[5] E05C 9/02

U.S. Cl. 292—336.3 **7 Claims**



1. A closure connecting rod mechanism for windows, or doors, having panels in which at least the panel frame is comprised of metal or plastic profiles, each panel having, on a grooved surface, a guide channel open in one direction, but undercut in profile on its sides, the channel formed to accomodate a longitudinally displaceable connecting rod, coupled at the open side of the channel with a control mechanism, which has a drive member which can be driven in rotatable manner by means of an operating handle and which is supported in a housing; wherein, further, a housing for the control mechanism is supported on the profile adjacent the open side of the guide channel for attachment to the channel; wherein, further, the operating handle is engaged, by means of a polygonal shaft from a room-side surface of the panel frame through a hole in the profile, into a correspondingly-sectioned recess in the drive member; wherein, in addition, the profile of the panel frame is provided with an opening in the region of incorporation of the control mechanism, which opening penetrates the bottom of the guide channel in the profile, and whereby a first housing segment of the control mechanism supporting the drive member passes through the opening in the bottom of the guide channel, while a second housing section, guiding the ends of a longitudinally mobile coupling slider in a permanent engagement with the drive element, is supported against the profile surface adjacent the open side of the guide channel.

characterized by the fact the

in said second housing segment, a rotating latch **24** is provided, supported in a bearing depression with an axis parallel to the principal plane of the drive member; that the rotating latch has on one side a tool engagement accessible through a front wall of said second housing segment while on the other side, it is provided with at least one projecting piece, the upper side of which is distanced from the rearward longitudinal edges of the second housing segment; whereby the projecting piece is encompassed, in a first rotating position of rotating latch, by a recess in the first housing segment, while when the latch is pivoted into a second rotational position, the projecting piece extends beyond the side surfaces of the first housing segment, into the undercut region of guide channel.

4,986,583

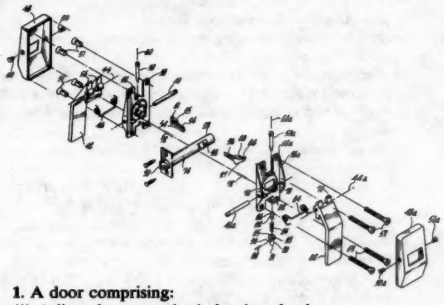
DOOR-LATCH OPENER

Andrew B. Campbell, San Mariano, and Ira J. Simon, Long Beach, both of Calif., assignors to Triangle Brass Manufacturing Company, Los Angeles, Calif.

Continuation of Ser. No. 249,448, Sep. 26, 1988, abandoned. This application May 30, 1990, Ser. No. 529,717

Int. Cl.[5] E05B 3/00

U.S. Cl. 292—336.3 **6 Claims**



1. A door comprising:

(1) A linearly actuated tubular door-latch;

(2) A push-type door-latch opener adapted to be mounted to the door for operating said door-latch comprising:

first mounting means for mounting said push-type door-latch opener to the door;

said first mounting means comprising a first base plate fabricated of stamped metal;

first horizontal pivoting means attached to said first mounting means;

first vertical pivoting means attached to said first mounting means and positioned at substantially a right angle to and adjacent to said first horizontal pivoting means;

a first horizontal bell crank pivoted about said first vertical pivoting means;

said first horizontal bell crank having a first arm projecting into the plane of the door and a second arm adapted to be contacted by a push-type door handle;

said push-type door handle pivoted about said first horizontal pivoting means;

said push-type door handle adapted to have a first out position and a second in position;

first biasing means biasing said push-type door handle to said first out position, said first biasing means mounted coaxial with said first horizontal pivoting means;

said push-type door handle having a first portion adapted to engage said second arm;

said push-type door handle adapted to be mounted with the handle pointed along the vertical length of the door;

said first base plate having a retainer hole therethrough:

a hollow canister mounted through said retainer hole

having a closed end, an open end, a retainer flange, an axis defined by the center of said open end and the center of said closed end, and a first hole through said hollow canister along a line normal to said axis;

a plunger having a second hole therethrough slidably mounted within said hollow canister;

said plunger having a retracted position and a protracted position; said push-type door handle prevented from attaining said second in position when said plunger is in said protracted position;

plunger biasing means biasing said plunger toward said protracted position;

a fire sensing material means having a predetermined melting point passing through said first hole and said second hole and retaining said plunger in aid retracted position against a plunger bias imparted by said plunger biasing means;

said plunger capable of movement from said retracted position along said axis and away from said closed end to said protected position upon melting of said fire sensing material means;

said hollow canister prevented from escape from said retainer hole by said retainer flange and said fire sensing material means; and

(3) A pull-type door-latch opener adapted to be mounted to the door for operating said door-latch comprising:

second mounting means for mounting said pull-type door-latch opener to the door;

said second mounting means comprising a second base plate fabricated of stamped metal;

second horizontal pivoting means attached to said second mounting means;

second vertical pivoting means attached to said second mounting means and positioned at substantially a right angle to and adjacent to said second horizontal pivoting means;

a second horizontal bell crank pivoted about said second vertical pivoting means;

said second horizontal bell crank having a third arm projecting into the plane of the door and a fourth arm adapted to be contacted by a pull-type door handle;

said pull-type door handle pivoted about said second horizontal pivoting means;

said pull-type door handle adapted to have a first in position and a second out position;

said pull-type door handle adapted to be mounted with the handle pointed along the length of the door;

second biasing means biasing said pull-type door handle to said first in position, said second biasing means mounted coaxial with said second horizontal pivoting means;

said pull-type door handle having a second portion adapted to engage said fourth arm.

4,986,584

ELECTRICAL STRIKE RELEASE

Duane K. Logas, San Bernardino, Calif., assignor to Adams Rite Manufacturing Company, City of Industry, Calif.

Continuation of Ser. No. 288,774, Dec. 22, 1988, Pat. No. 4,917,425. This application Nov. 13, 1989, Ser. No. 435,673

The portion of the term of this patent subsequent to Apr. 17, 2007, has been disclaimed.

Int. Cl.[5] E05C *19/16*

U.S. Cl. 292—341.16 **3 Claims**

1. In an electrical release door strike, the combination comprising

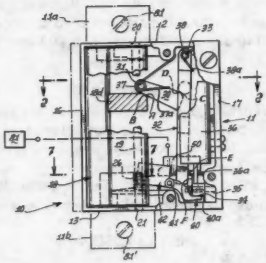
(a) a carrier frame,

(b) a strike bolt carried by the frame for pivoting when released, allowing door opening, the bolt adapted to receive a door and resist door opening force prior to said pivoting,

(c) means carried by the frame to release the strike bolt for such pivoting, including first, second and third arms,

(d) the first arm movable from a first position blocking bolt pivoting to a second position allowing bolt pivoting to in turn allow said door opening, the second arm movable from a primary position in which it holds the first arm is said first position to a secondary position in which it allows first arm movement to said second position, and the third arm movable from an initial position in which it holds the second arm in said primary position to a subsequent position in which it allows movement of the second arm to said secondary position, and

(e) including a solenoid carried by the frame to be operatively connected with the third arm, and wherein said third arm has a pivot axis about which it is pivotable in response to operation of the solenoid, the solenoid extending alongside the second arm,



(f) and the solenoid having an armature pivotally connected to the third arm at a locus below the solenoid to hold the third arm in its initial position when the solenoid is energized, the armature adapted to drop to displace the third arm to its subsequent position in the event the solenoid becomes de-energized,

(g) the solenoid having an upright axis, the third arm axis of pivoting extending generally horizontally in spaced relation to said solenoid upright axis, the third arm extending away from said axis of pivoting, and to a location beneath the solenoid, proximate said solenoid axis, the third arm releasably connected to the second arm at a location along the third arm between said axis of pivoting of the third arm and said locus.

4,986,585

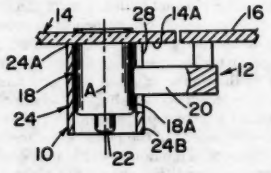
ANTI-THEFT GUARD FOR WING WINDOW LATCH SAFETY BUTTON

Scott C. Panter, 421 Nicole Cir., Wichita, Kans. 67233, and Leon C. Van Vessum, 2021 Jeanette, Wichita, Kans. 67203

Filed Mar. 1, 1990, Ser. No. 487,216

Int. Cl.[5] E05B *13/00*

U.S. Cl. 292—346 **18 Claims**



1. An anti-theft guard for use with a latch of a vehicle wing window of the type having a body mounted to the wing window for rotation about an axis extending generally normal to the wing window, a lever mounted to and extending from a side of the latch body for pivotal movement about the axis of the body between latching and unlatching positions, and a push

button mounted to and extending axially from the latch body for movement along the axis of the body upon being manually depressed to thereby permit rotating of the body and pivoting of the lever from the latching to unlatching position to permit opening of the wing window, said anti-theft guard comprising:

a hollow tubular sleeve open at its opposite ends for insertion at one open end over the latch body and being of sufficient length to extend beyond the body and shield the button from access except through the opposite open end of the sleeve;

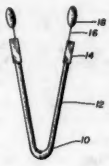
said sleeve having a longitudinal slot defined in a side portion thereof for passage therethrough of the latch lever when said sleeve is inserted over the latch body such that said sleeve is carried by the latch body and lever when the body is rotated and the lever is pivoted between the latching and unlatching positions.

4,986,586

DEVICE FOR REMOVING SOFT CONTACT LENS

Dinah K. Eilrich, and Calvin H. Eilrich, both of 11945 Fir Dr., Reno, Nev. 89506

Filed Oct. 16, 1989, Ser. No. 424,331
Int. Cl.[5] A61F *9/00*
U.S. Cl. 294—1.2 **4 Claims**



1. In a soft contact-lens aid device having a first and a second leg, each said leg having a first end and a second end, and a base at which said first ends are interconnected for providing a tweezer-like member, a first and second contact lens remover associated with said second ends of said legs, one said remover for one said second end, wherein the improvement comprises:

first and second mounting means for respectively mounting said first and second removers to a respective said second end of said legs, each said mounting means comprising means for adjustably positioning the respective said remover with respect to the respective said second end;

each said means for adjustably positioning allowing for the respective said remover to be adjusted with respect to the associated said second end both in a longitudinal, lengthwise direction and in an angular direction, said longitudinal direction being taken parallel to the length of the respective said leg;

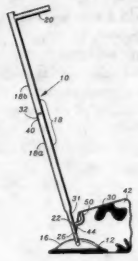
each said means for adjustably positioning comprising a sleeve member telescopingly, slidingly received over said second end of a respective said leg for free movement therealong; each said remover comprising an elongated main body element having a first end portion and a second end portion, and a soft-tip means at said second end portion of said elongated main body element for contacting a soft contact lens in an eye for effecting removal thereby; said first end portion of said elongated main body element being received between said second end of a respective said leg and said sleeve member, whereby the remover is frictionally held therebetween in a desired, adjusted-to position, said adjustment being accomplished by the location of said first end portion of said elongated main body element of the remover between the respective said sleeve member and second end of the leg.

4,986,587

REFUSE COLLECTING DEVICE

Amaro Lozano, 2833 Virginia Ave., Anaheim, Calif. 92806

Continuation-in-part of Ser. No. 410,667, Sep. 21, 1989, abandoned, which is a continuation of Ser. No. 192,931, May 10, 1988, abandoned. This application Mar. 23, 1990, Ser. No. 497,708
Int. Cl.[5] A01K *29/00*; E01H *1/12*
U.S. Cl. 294—1.4 **1 Claim**



1. A manually operated refuse collecting device comprising:

an elongated handle comprising an upper and a lower section, said sections being removably connected together;

a scoop portion comprising a bottom wall with normally extending edge portions which define side walls;

a disposable refuse collection container removably attached to said device to receive the refuse from said scoop portion;

means disposed at one end of said lower section of said handle to secure said scoop portion thereto and to removably attach said disposable refuse collection container;

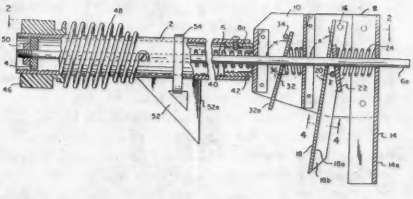
said means comprising a pair of opposed arms, each having a portion extending normally from the longitudinal axis of said lower section and terminating in a connection portion which extends parallel to the longitudinal axis of said lower section, said scoop portion of said device being disposed between said connection portions of said arms with each said arm secured to a sidewall of said scoop portion, attachment posts for said refuse collection container defined by outwardly extending ends of said connection portions of said arms and an L-shaped member affixed to said lower section and extending therefrom to define a support for the open mouth of an attached disposable refuse collection container.

4,986,588

WEED PULLER WITH PLUG EJECTING MEANS

Chester Price, 300 Chelsea St., P.O. Box 279, Forked River, N.J. 08731

Filed Sep. 15, 1989, Ser. No. 407,612
Int. Cl.[5] A01B *1/16*
U.S. Cl. 294—50.7 **14 Claims**



11. A weed pulling apparatus, comprising

(a) a tubular main body member having one end for insertion

into the ground around a weed to form a weed plug and having another end;

(b) a piston rod being longitudinally disposed within said main body member and having two ends;

(c) a piston connected to one of said ends of said piston rod;

(d) piston biasing means for biasing said piston toward the one end of said main body member;

(e) means for driving said piston rod for moving said piston toward the other end of said main body member into a retracted position, said driving means including a drive plate having an opening formed therein receiving said piston rod, and drive plate biasing means for biasing said drive plate toward a first angularly binding position relative to said piston rod;

(f) means for locking said piston rod with said piston in said retracted position, said locking means including a locking plate having an opening formed therein for receiving said piston rod, and locking plate biasing means for biasing said locking plate toward a second angularly binding position relative to said piston rod being different from said first angular binding position; and

(g) means for releasing said piston rod permitting said piston biasing means to move said piston from said retracted position and eject the weed plug from said main body member.

4,986,589

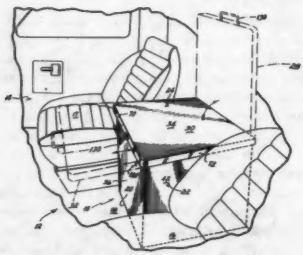
SECURITY FILE CABINET

Donald W. McNew, Lilburn, Ga., assignor to Leggett & Platt, Incorporated, Carthage, Mo.

Filed Aug. 22, 1989, Ser. No. 397,122

Int. Cl.[5] B60R *7/00*

U.S. Cl. 296—37.8 **16 Claims**



1. A van style vehicle body comprising a passenger compartment having a floor and at least one forward facing bucket-type seat mounted upon said floor, a security file cabinet mounted upon said floor adjacent on side of said seat,

said security file comprising an open top file cabinet and a lid assembly, said file cabinet having a bottom wall and a sidewall, said bottom wall being fixedly secured to said floor of said vehicle body,

guide rail means located internally of said file cabinet and supported from the sidewall thereof, a plurality of file dividers contained internally of aid file cabinet and movably supported from said guide rail means,

said lid assembly having a flat top writing surface, means mounting said lid assembly upon said file cabinet for pivoted movement between an open position in which the open top of said container is uncovered and a closed position in which said flat top surface of said lid covers said open top of said file cabinet, and

slidable support means for supporting said flat top surface of said lid assembly for horizontal sliding movement between a first position in which said flat top surface overlies said open top of said container and a second position in which at least a portion of said flat top surface of said lid assembly is located forwardly of said open top of said cabinet so as to facilitate use of said flat top surface as a flat writing surface for a person seated on said seat.

6. A van style vehicle body comprising a passenger compartment have a floor and at least forward facing bucket-type seat mounted upon said floor, a security file cabinet mounted upon said floor adjacent one side of said seat,

said security file comprising an open top file cabinet and a lid assembly, said file cabinet having a bottom wall and a sidewall, said bottom wall being fixedly secured to said floor of said vehicle body,

said lid assembly having a flat top surface, means mounting said lid assembly upon said file cabinet for pivoted movement between an open position in which the open top of said container is uncovered and a closed position in which said flat top surface of said lid covers said open top of said file cabinet,

slidable support means for supporting said flat top surface of said lid assembly for horizontal sliding movement between a first position in which said flat top surface overlies said open top of said container and a second position in which at least a portion of said flat top surface of said lid assembly is located forwardly of said open top of said cabinet so as to facilitate use of said flat top surface as a flat writing surface for a person seated on said seat,

said security file including a lock for securing said lid assembly against pivoted opening movement and sliding movement relative to said open top of said container,

said flat top surface of said lid assembly overlying said open top of said cabinet in said first position of said lid assembly and exposing the rear portion of said open top of said second position,

said lid assembly comprising a lid frame and a lid cover, said top surface of said lid forming a portion of said lid cover, said lid frame being pivotally mounted on said lid cabinet and said lid cover being slidably mounted on said lid frame,

said lid frame comprising a pair of side channels, each of said channels being U-shaped in cross section and being open toward the side of said frame,

means slidably supporting said lid cover from said side channels, and

said lid cover having a front skirt and a pair of sidewall skirts extending downwardly from the front and side edges, respectively, of said flat top surface, said sidewall skirts having stop means extending inwardly from an inside surface thereof and movable within said side channels of said lid frame.

4,986,590

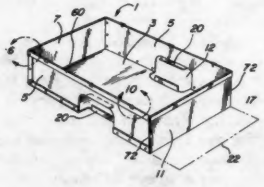
TRUCK BED LINER

Anthony G. Patti, San Gabriel; Larry L. DeHart, Sr., Placentia, and Larry L. DeHart, Jr., Walnut, all of Calif., assignors to All Tech Industries, Brea, Calif.

Filed Apr. 20, 1989, Ser. No. 340,918

Int. Cl.[5] B62D *33/00*

U.S. Cl. 296—39.2 **20 Claims**



1. A protective liner for a truck bed comprising:

a plurality of panels;

a plurality of connectors to connect said panels together to form said liner; and

a plurality of fasteners, each of said plurality of fasteners comprising a hook portion attaching to the edge of said linear and an adhesive portion for fastening said linear to said truck bed.

4,986,591

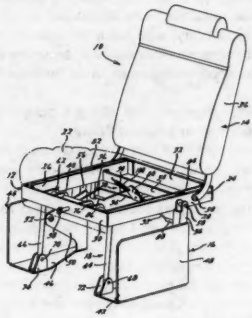
LOW PROFILE FOLDING SEAT

Robert E. Martienssen, and William J. Eubank, both of Livonia, Mich., assignors to Ford Motor Company, Dearborn, Mich.

Filed Oct. 12, 1988, Ser. No. 256,449

Int. Cl.[5] B60N 2/16

U.S. Cl. 296—65.1 14 Claims



1. A stowable seat assembly for a vehicle comprising:

a seat cushion assembly having a generally horizontally positioned frame;

a seat back pivotally mounted for movement between a substantially vertical position and a substantially horizontal position wherein a front face of the seat back engages a top surface of the seat cushion assembly;

elongated link means having one end pivotally mounted to the seat cushion frame and the other end pivotally mounted to the vehicle for movement through a pivotal path and movable between an operative position wherein the seat cushion frame is spaced from the floor of the vehicle and a stowed position wherein the seat cushion frame is lowered from said operative position to a position more proximate the vehicle floor;

a support frame fixedly mounted to the vehicle floor and comprising a pair of spaced, vetically upstanding side plates positioned laterally outboard the seat cushion frame and the elongated link means, the side plates extending upwardly above the elongated link means when the seat beack is in the horizontal position and the seat cushion is in the stowed position.

means defining a plurality of detents on the support frame arcuately arrayed in the pivotal path of the elongated link means;

catch means carried with the seat cushion frame and engageable with the detents for resisting movement of the seat cushion frame between the operative position and the stowed position and defining with at least one of said detents at least one intermediate position therebetween;

means resiliently biasing the catch means into engagement with the detents; and

means carried on the seat cushion frame for disengaging the catch means from the detents.

4,986,592

ANTI-GLARE DEVICE

Klaus P. Kaiser, Wermelskirchen; Lothar Viertel, Altforweiler, both of Fed. Rep. of Germany, and Patrick Welter, Lachambre, France, assignors to Gebr. Happich GmbH, Fed. Rep. of Germany

Filed Feb. 12, 1990, Ser. No. 478,656

Claims priority, application Fed. Rep. of Germany, Feb. 14, 1989, 3904367

Int. Cl.[5] B60J 3/00

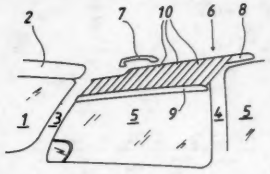
U.S. Cl. 296—97.8 27 Claims

1. An anti-glare device for use in motor vehicles, or the like, comprising:

first and second profiled strips extending generally parallel to each other, the first strip being fastenable to an interior portion of the vehicle; each profiled strip having a respective groove therein extending along the profiled strip, with the first groove of the first strip facing in one direction and the second groove of the second strip facing in the opposite direction and generally toward the first groove;

a plurality of slats arranged so that each slat at least partially overlaps the neighboring slat, each slat having opposite longitudinal ends which extend between the first and the second profiled strips, each slat having one side of the slat and an opposite side of the slat;

pivot connection means at each longitudinal end of the slat and at the respective profiled strip at each slat end for



enabling the slats to pivot with respect to the profiled strips as the second profiled strip is moved apart or toward the first strip; the pivot connection means of each slat comprises a support pin at each longitudinal end of the slat including a first support pin on the one side of the slat and a second support pin on the opposite side of the slat, the first support pin being disposed in the first groove of the first strip and the second support pin being disposed in the second groove of the second strip with the grooves and pins being so oriented as to enable the pins to be installed in the grooves, and the slats are pivotable about the pins in the respective grooves', and the pins of neighboring slats are so spaced apart along the respective grooves that the slats partially overlap as they are pivoted and in the use position.

4,986,593

WORK CABIN HAVING A FRONT WINDOWPANE

Karl Lohmann, Datteln, Fed. Rep. of Germany, assignor to O & K Orenstein & Koppel Aktiengesellschaft, Dortmund

Filed Jun. 2, 1989, Ser. No. 360,211

Claims priority, application Fed. Rep. of Germany, Jun. 24, 1988, 3821308

Int. Cl.[5] B62D 33/06

U.S. Cl. 296—190 9 Claims

1. In a work cabin that has a front windowpane having lower portions, which is disposed in a frame of said cabin for a front window, has a closed position, and is to be introducible and selectively fixable in an interior roof space of said cabin having walls, and that has roller bearings, which are laterally articulated in the vicinity of corner regions of said front windowpane and are guided in two U-shaped guide rails of said cabin, the improvement comprising:

respective spring cable pulleys that are disposed adjacent the ends of upper portions of both of said guide rails, remote from said closed position of said front windowpane;

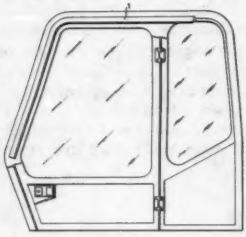
guide rollers secured to said walls of said cabin, a cable extending from said spring cable pulleys and having cable ends that are guided over said guide rollers and are attached to lower portions of said front windowpane when viewed in said closed position thereof;

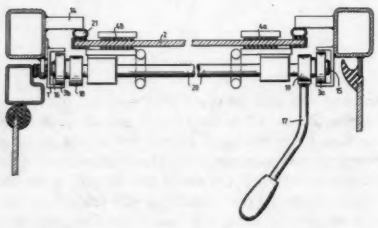
a shaft that, when said front window pane is viewed in said closed position thereof, spans the two upper corner regions of said front windowpane between said roller bearings at said upper corner regions;

a hand lever provided on said shaft for rotating same; and

eccentric wheels provided laterally on said shaft, whereby said upper region of said front windowpane, which is indirectly supported on said roller bearings that are associ-

ated with said upper corner regions thereof and on said guide rails, is guided into or out of said roof space of said cabin via rotation of said eccentric wheels, with said front





windowpane thereby being releasable from or selectively fixable to said cabin frame for a front window over the entire path of said guide rails.

4,986,594

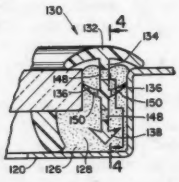
AUTO WINDOW MOULDING

Peter Gold; Judith Gold, and Meredith Gold, all of 465 North Wood Rd., Rockville Centre, N.Y. 11570

Filed Jul. 16, 1990, Ser. No. 552,925

Int. Cl.[5] B60J *1/02*

U.S. Cl. 296—201 **2 Claims**



1. In a motor vehicle body, an improved moulding for concealing the space between a body panel flange and the edge of a window panel mounted on a body panel flange by a curable adhesive of the type wherein said moulding has a crown portion adapted to bridge the space between the window panel and the body panel in overlying engagement therewith, and has a depending stem extruded integral with the crown portion extending generally normal therefrom for insertion into the space between the window panel and body panel and serving as a divider between the quantities of adhesive undergoing coring on opposite sides thereof, said improvements in said moulding comprising said stem having openings therethrough in communication with said opposite side-located adhesive so as to contribute to equalizing any pressure differential during the curing thereof, whereby the crown on said moulding remains in said overlying engagement as a bridge over said space between the window panel and the body panel.

4,986,595

MECHANICAL INTERLOCK OF CURABLE SEALANT FOR MODULAR FRAMED AUTO GLASS PARTS

Peter N. Gold, 465 N. Wood Rd., Rockville Centre, N.Y. 11570

Filed Jan. 24, 1990, Ser. No. 468,753

Int. Cl.[5] B60J *1/02*

U.S. Cl. 296—201 **5 Claims**

1. A retention system for use with a curable adhesive for retaining a glass window pane supported on a flange of an automotive vehicle body, said retention system comprising:

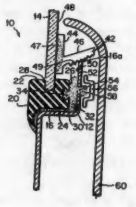
a moulding having an inner surface, an outer surface and a rear surface connecting said inner surface to said outer surface:

a glass window pane secured along a periphery thereof to the inner surface of said moulding:

the flange separated by a first spaced distance from the outer surface of said moulding and separated by a second spaced distance from said rear surface of said moulding:

means defining a shaped recess within said rear surface of said moulding, said shaped recess having an opening adjacent to said flange, said recess having an end wall located at a farther distance from said flange than said opening is located, and said recess having a sidewall connecting said opening to said end wall to define and interior portion, a cross section of said opening of the recess being smaller than a cross section of the interior portion:

a curable ashesive received within said first spaced distance between the outer surface of said moulding and said flange and received within said second spaced distance between the rear surface of said moulding and said flange, and also received within said shaped recess, so as to form a me-



chanical interlock between the curable adhesive, upon the curing thereof, and the shaped recess:

wherein said flange has an inner surface and an outer surface,

a plurality of openings in said flange connecting said flange inner surface to said flange outer surface; and

a plurality of retaining means attached to said outer surface of said flange, each of said retaining means having an interior portion thereof in communication with each of said openings in said flange and receiving the curable adhesive, a cross section of said interior portion, of said retaining means, receiving the curable adhesive of each of said retaining means being greater than a cross section of said openings in said flange whereby a mechanical interlock is also formed between the curable adhesive, upon the curing thereof, and the outer surface of the said flange.

4,986,596

BAGGAGE CART BODY

Pierre R. Gohier, Midvale, Utah, assignor to Wedge Products Inc., Cleveland, Ohio

Division of Ser. No. 235,705, Aug. 19, 1988, Pat. No. 4,949,986, which is a continuation of Ser. No. 911,582, Sep. 24, 1986, abandoned. This application Nov. 1, 1989, Ser. No. 430,157

Int. Cl.[5] B62D *25/06, 25/08, 25/20*

U.S. Cl. 296—203 **20 Claims**

1. A baggage cart body, comprising:

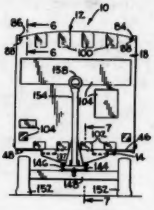
a. at least one double-walled plastic end member including an inner end wall and an outer end wall spaced apart from each other, each of said inner and outer end walls being

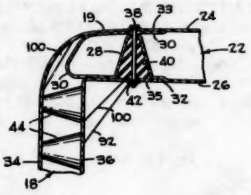
disposed substantially vertical and including a contiguous upper extension portion extending substantially horizontally, said upper extension portions of said inner and outer end walls defining an upper open groove therebetween; and

b. a double-walled plastic roof member disposed substantially horizontal and having a tongue portion at one longitudinal end thereof, said tongue portion of said roof member being inserted in said upper open groove of said end member, said roof member including:

an upper roof wall and a lower roof wall spaced apart from each other, and

a plurality of roof kiss-offs disposed in said tongue portion of said roof member, each of said roof kiss-offs including a generally conical depression formed in one of said upper and lower roof walls and extending into contact with the other of said upper and lower roof walls.





4,986,597

VEHICLE SPACE FRAME AND A METHOD FOR MANUFACTURING OF VEHICLE SPACE FRAME PARTS

Edvin L. Clausen, Tonder, Denmark, assignor to Norsk Hydro A.S., Oslo, Norway

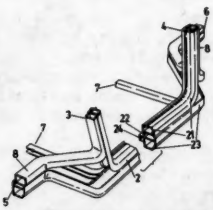
PCT No. PCT/NO89/00086, § 371 Date May 9, 1990, § 102(e) Date May 9, 1990, PCT Pub. No. WO90/02680, PCT Pub. Date Mar. 22, 1990

PCT Filed Aug. 29, 1989, Ser. No. 488,008

Claims priority, application Norway, Sep. 9, 1988, 884034

Int. Cl.[5] B62D *21/00*

U.S. Cl. 296—205 **8 Claims**



6. A vehicle space frame comprising longitudinally extending load-bearing structural members, each said load-bearing structural member comprising:

an integrally extruded multicavity shape having at least one end thereof longtiudinally split into at least two individual sections; and

said individual sections extending at predetermined angles to said shape, thus forming structural parts of the frame.

4,986,598

WIND DEFLECTOR FOR A SUNROOF

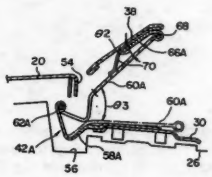
Takatsugu Yamauchi, Toyota, and Kouichi Ito, Kariya, both of Japan, assignors to Toyota Jidosha Kabushiki Kaisha & Aisin Seiki Co., Ltd., Japan

Continuation of Ser. No. 180,766, Apr. 12, 1988, abandoned. This application Aug. 1, 1989, Ser. No. 390,502

Claims priority, application Japan, Apr. 24, 1987, 62-62489[U]

Int. Cl.[5] B60J *7/22*

U.S. Cl. 296—217 **25 Claims**



1. A wind deflector for a sunroof mounted on a roof of a vehicle comprising:

a housing of a slidable panel provided along a periphery of an opening of said roof;

a rain gutter disposed at a front end portion of said housing and positioned directly under a forward edge of said opening of said roof;

hinge means comprising first and second hinge pieces, said first hinge piece being non-rotatably fixed to said housing at a position rearward from said rain gutter, with a front end portion of said first hinge piece being positioned forward of said forward edge of said opening of said roof, and a front end portion of said second hinge piece being connected pivotally through a pivot portion with said front end portion of said first hinge piece, the pivot portion located at a position higher than and displaced forwardly from a rear end portion of the first hinge piece and being disposed in a position directly above said rain gutter below said roof; and

a deflector panel provided at a rear end portion of said second hinge piece and being movable between a first position in which said deflector is stowed below the level of said roof and a second position in which said deflector projects upwardly from said roof.

4,986,599

BABY CARRIER

Robert D. Wise, Akron, Ohio, assignor to Century Products Company, Macedonia, Ohio

Continuation of Ser. No. 356,972, May 24, 1989, abandoned, which is a continuation of Ser. No. 876,960, Jun. 20, 1986, abandoned, which is a continuation of Ser. No. 550,261, Nov. 8, 1983, Pat. No. 4,634,175. This application Jan. 26, 1990, Ser. No. 471,685

The portion of the term of this patent subsequent to Jan. 6, 2004, has been disclaimed.

Int. Cl.[5] A47D *1/00*

U.S. Cl. 297—183 **4 Claims**

1. In a baby carrier having a shell seat with sides and a rotatable handle, all bilaterally symmetrical about a lengthwise plane, a handle support pivot comprising:

a hub gear having a planar area disposed on the shell;

a rim extending from said planar area, and having a circumferential surface including a plurality of spaced apart notches;

a shaft extending from said planar area; and

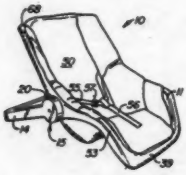
a cap at an end of said handle, secured to said shaft, including a drum portion for rotatable engagement about said rim, the drum portion comprising a plunger opening;

a spring; and

a radially extending plunger disposed between said planar area and said cap and including:

an outer portion extending through said plunger opening;

an inner portion including a radially extending slot having a



first portion through which said shaft extends and a second portion for retaining said spring between a boundary surface of the second portion and the shaft, wherein said second portion is axially offset from said first portion;

said second portion including a plunger peg positioned for mating engagement with said notches in said rim.

4,986,600

COLLAPSIBLE INFANT SEAT

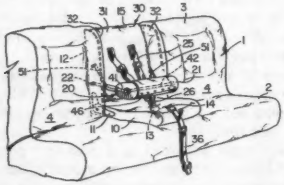
Roland Leblanc, 288 Chemin Calumet, Bryson, Quebec, Canada J0X 1H0 , and Gaetan Boutin, deceased, late of Bryson, Canada by Sylvie Tessier, executor

Filed Aug. 8, 1988, Ser. No. 229,409

Claims priority, application Canada, Aug. 7, 1987, 544032

Int. Cl.[5] B60N *1/12*

U.S. Cl. 297—238 **7 Claims**



1. A collapsible child's seat formed as part of a vehicle bench seat, said vehicle bench seat including a bench portion and an upright back, said collapsible child's seat comprising:

a seat portion formed as a separate contoured padded slab connected at the lower end thereof to said upright back of said bench seat to be pivotable between a closed position, in which said seat portion forms a lower and a middle portion of said upright back of said bench seat and is flush with the remainder of said upright back, and an open position overlying said bench portion;

said lower and middle portions of said upright back of said bench seat being formed with a recess therein to receive said child's seat portion when in the closed position, said recess having a width and depth substantially corresponding to the width and depth, respectively, of said child's seat portion, a back portion and sidewalls of said child's seat being fixed and being defined by respective side surfaces and a back surface of said recess;

said back portion and said sidewalls of said child's seat being formed by the contour of said recess of said upright back when said child's seat portion overlays said bench portion;

a U-shaped, pivotable, padded restraint means;

bracket means disposed on either side of, and approximately at the midpoint in height of, said recess and pivotally connected to the frame of said vehicle to support said U-shaped, pivotable, padded restraint means which forms an upper part of, and is flush with, said upright back when said restraint means is not engaged, and which extends outwardly at an angle of approximately 90 degrees from said upright back when engaged;

said U-shaped pivotable padded restraint means being vertically disposed over said child's seat, when engaged, to enclose an area above said child's seat to restrain movement of a child;

fastening means for securing said child's seat portion in said open position overlaying said bench; and

harness means, extending between said seat portion and said back portion formed in said recess, for strapping in an occupant of said collapsible child's seat.

4,986,601

TILTING MECHANISM FOR SUPPORTING SEAT PORTION AND BACKREST OF CHAIR IN INTEGRAL FASHION

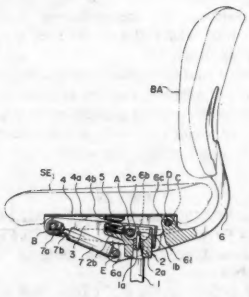
Noboru Inoue, Tokyo, Japan, assignor to Itoki Co., Ltd., Osaka, Japan

Filed Nov. 16, 1989, Ser. No. 437,101

Claims priority, application Japan, Nov. 30, 1988, 63-154864[U]

Int. Cl.[5] A47C *1/032*

U.S. Cl. 297—301 **5 Claims**



1. A tilting mechanism for supporting a seat portion that extends forwardly and a backrest of a chair in integral fashion, comprising:

an upright support;

a pedestal block for swivel movement mounted on the upper end of said upright support;

an arm member having a rear end pivotally engaged with said pedestal block by a first horizontal shaft carried forwardly of said upright support;

a seat plate having a front portion pivotally engaged with a front end of said arm member by a second horizontal shaft;

an elastic body lying between said seat plate and said pedestal block;

a backrest supporting member on which a backrest can be mounted, carried in part below said seat plate, said backrest supporting member being pivotally engaged at a rearwardly extending portion with a rear portion of said seat plate by a third horizontal shaft carried in an oblong hole in said seat plate and pivotably engaged at a forwardly extending portion with said pedestal block by said first horizontal shaft; and

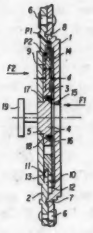
a gas spring 7 connecting between a fourth shaft mounted on a front end of said backrest supporting member and said second horizontal shaft.

4,986,602

IRREVERSIBLE CONTINUOUS PIVOTAL CONNECTION

Jean-Marie Blanchard, Nogent/Vernisson, France, assignor to Tubauto, Levallois-Perret, France

Filed Feb. 14, 1989, Ser. No. 310,358
Claims priority, application France, Feb. 23, 1988, 88 02141
Int. Cl.[5] B16N *1/06*
U.S. Cl. 297—362 12 Claims



1. An irreversibly continuous pivotal connection between a fixed part and a movable part, comprising:

a fixed side plate fixed with respect to said fixed part and having an arcuate array of teeth;

a movable side plate fixed with respect to said movable part and having an arcuate array of teeth; means for mounting said movable side plate parallel to said fixed side plate for rotation about a fixed axis common to said fixed and movable side plates;

a planet gear positioned between said fixed and movable side plates, said planet gear having two axially spaced, arcuate arrays of teeth each locally meshing with respective ones of said arcuate arrays of teeth of said fixed and movable side plates, the arrays of teeth of said planet gear having diameters different from one another;

an eccentric member mounted for rotation about said fixed axis and pressing on said planet gear such that rotation of said eccentric member in one direction causes epicyclic rotation of said planet gear in another direction;

a locking disc rotatably fixed relative to said eccentric member and positioned between said planet gear and one of said fixed and movable side plates,

wherein a torque applied to said movable side plate with respect to said fixed axis causes a wall of said planet gear facing that of said locking disc to rock from an initial plane thereof by an amount sufficient to come into contact locally against said wall of said locking disc, causing frictional locking of said planet gear with respect to said locking disc and therefore locking of said movable side plate with respect to said fixed side plate.

4,986,603

FRAME OF A VEHICLE SEAT PROVIDED WITH A CHILD SEAT

Toshimichi Hanai, Yokosuka; Hideyuki Nagashima, Yokohama, and Yasuyuki Fujita, Tokyo, all of Japan, assignors to Tachi-S Co., Ltd., Tokyo and Nissan Motor Co., Ltd., Yokosuka City, both of, Japan

Filed Jun. 7, 1989, Ser. No. 362,708
Claims priority, application Japan, Jun. 17, 1988, 63-79476[U]
Int. Cl.[5] B60R *22/26*
U.S. Cl. 297—468 5 Claims

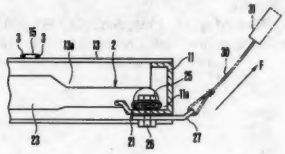
1. Structure of a frame of a vehicle seat provided with a child seat, comprising

a seat belt anchor for the child seat mounted at a rear side of a seat back and firmly fixed to the frame,

the frame comprising front frame, back frame, right and left frame members concave-shaped in section,

a reinforcing member bent in concave shape and being fixed to the back, right, and left frame members,

said reinforcing member having ends arranged to form substantially vertical portions firmly fixed to the respective



right and left frame members and a substantially horizontal portion at the middle thereof firmly fixed to an internal surface of the back frame member,

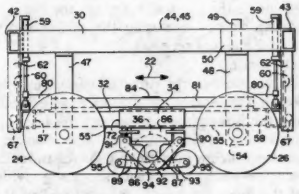
wherein the seat belt anchor is fixed to the back frame member of the frame.

4,986,604

ROADWAY GROOVING APPARATUS

Donald F. Meister, Overland Park, Kans., assignor to Target Products Inc., Kansas City, Mo.

Filed Feb. 7, 1989, Ser. No. 307,816
Int. Cl.[5] E01C *23/09*
U.S. Cl. 299—39 17 Claims



3. A machine for forming transverse grooves in a road surface, comprising:

a main frame having first and second ends;

first road wheels attached to the main frame near the first end;

second road wheels attached to the main frame near its second end such that the main frame is movable along a path established by the road wheels;

a sub-frame arranged with the main frame for up-and-down motion;

a carriage slidably mounted on the sub-frame for motion parallel to the movement path established by the road wheels;

power means for moving the carriage along the sub-frame, the power means comprising a first pulley means attached to a first end of the sub-frame, a second pulley means attached to a second end of the sub-frame, and a cable extending around the pulleys, the cable having an anchorage on the carriage;

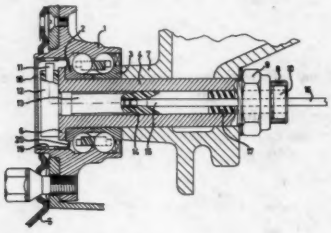
a grooving cutter head supported by the carriage for forming spaced grooves in a road surface, the carriage having a sufficient motion on the sub-frame so as to permit the cutter head to move between a first position in near adjacency to the first road wheels and a second position in near adjacency to the second road wheels.

4,986,605

ASSEMBLY OF A VEHICLE NON-DRIVING WHEEL HUB EQUIPPED WITH A PULSER AND SENSOR DEVICE FOR MEASURING THE SPEED OF ROTATION OF THE WHEEL

Michel Descombes, Versailles, France, assignor to SKF France, Clamart, France

Filed May 15, 1989, Ser. No. 351,500
Claims priority, application France, May 19, 1988, 88 06720
Int. Cl.[5] B60B 27/00
U.S. Cl. 301—105 R 17 Claims



1. A wheel hub assembly for a non-driving wheel of a vehicle comprising:

a bearing assembly having a rotatable outer ring, two nonrotatable inner rings, and two rows of rolling elements located between said outer ring and said inner rings, said outer ring including means for mounting thereon a non-driving wheel of a vehicle, said outer ring having an internal recess,

a pulser and sensor unit including a pulser and a sensor located inside the internal recess of the outer ring,

a closing cap tightly enclosing the pulser and sensor unit within said internal recess,

a stub axle carrier,

a stub axle mounted on the stub axle carrier independently of said bearing assembly, said stub axle extending axially through the inner rings to support the bearing assembly, said stub axle having outboard and inboard ends, said outboard end being near the means for mounting a wheel and being provided with a shoulder flange which bears on one of the inner rings, said inboard end of the stub axle including a threaded portion.

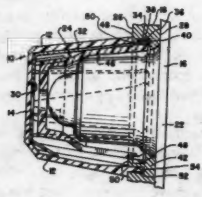
a stop nut threaded on said threaded portion of the stub shaft to tighten the inner rings against the stub axle carrier and to retain the stub axle on the stub axle carrier.

4,986,606

AUTOMOBILE MEDALLION ANTI-THEFT LOCKING DEVICE

John V. Thomas, 665 Park Dr., Barrington, Ill. 60010

Filed May 23, 1989, Ser. No. 355,998
Int. Cl.[5] B60B 7/06
U.S. Cl. 301—108 R 12 Claims



1. A method of locking a wheel medallion to the wheel of a vehicle wherein the medallion is of the type having a plurality of protruding spring retainers supplied with clips that are configured to pass into an opening in the hub of the wheel having a hub flange and abut a recess in the hub flange such that the medallion is held in place on the wheel with a well in the medallion designed to accommodate a grease gap therein, said method comprising:

providing a medallion locking cup having a dimension smaller than the medallion well and configured to fit therein;

locating said locking cup inside the well of the medallion and within the confines of the clips; and

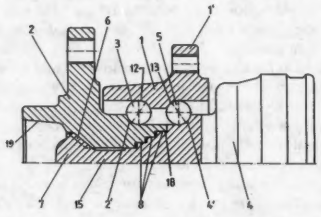
rotating said locking cup to hold the clips in an outward position abutting the recess of the wheel and to prevent the clips from passing out of the recess through the opening so that the medallion is locked to the wheel.

4,986,607

WHEEL MOUNT FOR DRIVEN WHEELS

Heinrich Hofmann, Schweinfurt, and Manfred Tröster, Bad Kissingen, both of Fed. Rep. of Germany, assignors to FAG Kugelfischer Georg Schafer (KGaA), Fed. Rep. of Germany

Filed Jan. 23, 1990, Ser. No. 468,589
Claims priority, application Fed. Rep. of Germany, Mar. 4, 1989, 3902141
Int. Cl.[5] B60B 35/18
U.S. Cl. 301—124 R 6 Claims



1. A wheel mount for a driven wheel, comprising:

an axially outward part and an axially inward part;

the outward part having an outer periphery on which a first inner race for a first row of rolling elements is defined; the outward part having an axial bore therethrough with an internal periphery;

the inward part including a fastening journal which projects from the inward part axially into the bore of the outward part; the fastening journal having an outer periphery; a second inner race being defined on the outer periphery of the fastening journal at the part of the outer periphery of the fastening journal located axially inward of the outward part; the second inner race being for a second row of rolling elements;

the fastening journal having an annular, stepped periphery with a plurality of different radius steps defined on it and the bore of the outward part having an annular surface which is stepped complementary to the stepped periphery of the fastening journal, such that with the inward part and the outward part pressed axially together, the complementary steps come into engagement to orient the outward part and the inward part with respect to each other;

an outer ring around the first and second inner races, the outer ring defining first and second outer races for two respective rows of rolling elements; the first and second outer races overlying the respective inner races;

a first row of rolling elements between the first inner and outer races; a second row of rolling elements between the second inner and outer races;

the bore of the outward part including obliquely arranged

toothing thereon oriented for defining a connection for fixing the outward part and the inward part for rotation together; the fastening journal being of an axial length to extend out to the oblique toothing of the hub, and the journal being deformed to form a bead at the oblique toothing to engage in the toothing for causing mechanical engagement between the fastening journal and the outward part at the toothing;

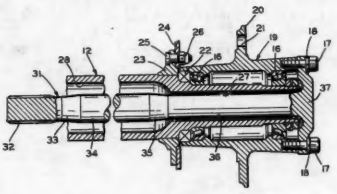
wherein the oblique orientation of the toothing is such that in the direction axially outward into the outward part, the toothing is oriented so as to widen radially outward, thereby enlarging the diameter of the bore of the outward part.

4,986,608

HIGH TORQUE CAPACITY AXLE SHAFT

Gregory A. Fett, Fort Wayne, Ind., assignor to Dana Corporation, Toledo, Ohio

Filed Jul. 27, 1988, Ser. No. 224,656
Int. Cl.[5] B60B *35/12*
U.S. Cl. 301—124 R **9 Claims**



1. A full floating axle assembly for a vehicle comprising:

a hollow axle housing having a reduced inner diameter spindle portion at an outer end thereof and a larger diameter portion extending from said reduced inner diameter spindle portion;

a wheel hub rotatably supported on said axle housing spindle portion;

a drive axle shaft extending through said axle housing and terminating in a flanged end beyond said reduced inner diameter spindle portion of said axle housing, said drive axle shaft including a smaller diameter shaft body extending from said flanged end and through said reduced diameter spindle portion of said axle housing and an increased diameter portion extending inwardly from said reduced inner diameter spindle portion of said axle housing, said increased diameter portion having a maximum diameter slightly smaller than a minimum inner diameter of said axle housing spindle portion; and

means for attaching said flange portion of said drive axle shaft to said wheel hub for rotation therewith; whereby torsional yield strength and fatigue life of said drive axle shaft are significantly increased.

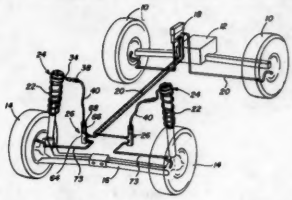
4,986,609

LOAD SENSING PROPORTIONING VALVE FOR BRAKE SYSTEM

Joe S. Cole, Mesquite, and Neil B. Christopher, Arlington, both of Tex., assignors to Surfaces, Inc., Carrollton, Tex.

Filed Sep. 16, 1985, Ser. No. 776,447
Int. Cl.[5] B60T *8/30*
U.S. Cl. 303—9.69 **3 Claims**

1. In combination with the hydraulic brake system of a vehicle having a master cylinder operatively associated with a brake pedal for supplying pressurized hydraulic fluid to rear wheel brakes through independent pressure lines, means regulating braking pressure supplied to the rear wheel brakes of the vehicle proportional to the weight supported by the rear wheels to reduce or eliminate premature rear wheel locking when applying the brakes on a lightly loaded vehicle and to maintain adequate breaking force for the same vehicle heavily loaded, said means comprising a pair of load sensing devices with a load sensing device interposed between the rear suspension system for each rear wheel and each side of the vehicle frame, each load sensing device providing a supply of incompressible fluid at a pressure proportional to the weight supported by the load sensing device, a load proportioning valve in each independent pressure line between the master cylinder and each rear wheel brake, each proportioning valve including



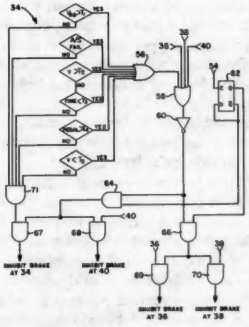
an actuating means, means communicating the supply of pressurized incompressible fluid provided by the load sensing device at one side of the frame to the actuating means included in the proportioning valve in the pressure line to the rear wheel brake at the same side of the frame, said actuating means being responsive to incompressible fluid pressure for regulating the movement of each proportioning valve to independently vary the braking pressure supplied to the respective rear wheel brakes, thereby independently varying the braking torque exerted on each of the rear wheels in response to variation in load on each of the rear wheels.

4,986,610

BRAKE SYSTEM WITH BRAKE SELECTION MEANS

Arnold A. Beck, Clinton; Edgar J. Ruof, Akron; John Nedelk, Massillon; Ralph J. Hurley, Mogadore, and Steven R. Smithberger, North Canton, all of Ohio, assignors to Aircraft Braking Systems Corporation, Akron, Ohio

Continuation-in-part of Ser. No. 312,994, Feb. 21, 1989, Pat. No. 4,923,056. This application Jul. 17, 1989, Ser. No. 380,324
Int. Cl.[5] B60T *8/86*
U.S. Cl. 303—93 **17 Claims**



1. A brake system for a vehicle, comprising:

first and second sets of brakes associated with respective sets of wheels of the vehicle;

operator controlled brake actuation means interconnected with said first and second sets of brakes for allowing an

operator to regulate application and release of brake pressure at said brakes;

wheel speed sensing means associated with said wheels for producing a wheel signal indicative of instantaneous speed of the vehicle; and

brake selection means interconnected between said first and second sets of brakes and said wheel speed sensing means for enabling said first set of brakes to receive said application and release of brake pressure while inhibiting said second set of brakes from receiving said application and release of brake pressure when said speed of the vehicle is below a first predetermined threshold speed.

4,986,611

ANTI-LOCK BRAKE CONTROL SYSTEM FOR USE IN MOTOR VEHICLE

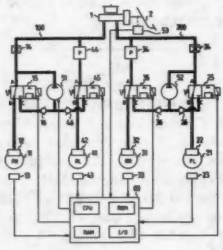
Takahiro Goshima, Gifu; Kazutoshi Yogo, Showa; Hideo Wakata, Midori, and Masashi Kishimoto, Chiryu, all of Japan, assignors to Nippondenso Co., Ltd., Kariya, Japan

Filed Feb. 20, 1990, Ser. No. 483,214

Claims priority, application Japan, Feb. 20, 1989, 1-39754; Aug. 1, 1989, 1-199895

Int. Cl.[5] B60T 8/32

U.S. Cl. 303—100 9 Claims



1. An anti-lock brake control system for use in a motor vehicle having at least a pair of wheels, comprising:

hydraulic pressure supply means for applying a braking pressure from a master cylinder of said motor vehicle to a pair of wheel-braking cylinders for braking said pair of wheels;

a pump provided in said hydraulic pressure supply means to decrease both the braking hydraulic pressures in said pair of wheel-braking cylinders;

a pair of control valves having three ports and provided in said hydraulic pressure supply means, each of said pair of control valves being arranged to have a first position at which said master cylinder is communicated with each of said pair of wheel-braking cylinders and a suction side of said pump is disconnected to said wheel-braking cylinder and further have a second position at which said master cylinder is disconnected to said wheel-braking cylinder and said suction side of said pump is communicated with said wheel-braking cylinder; and

electronic control means for effecting duty control of said pair of control valves so that the time periods at which said pair of control valves are at said second positions are not overlapped with each other.

4,986,612

BRAKE FLUID PRESSURE CONTROL APPARATUS FOR A VEHICLE

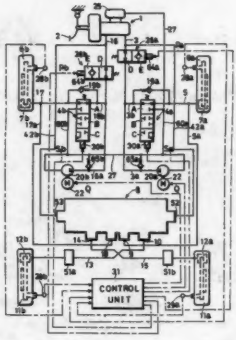
Tetsuro Arikawa, Kanagawa, Japan, assignor to Nippon A B S, Ltd., Tokyo, Japan

Filed Oct. 25, 1988, Ser. No. 262,530

Claims priority, application Japan, Oct. 26, 1987, 62-269819; Nov. 2, 1987, 62-277870

Int. Cl.[5] B60T 8/32

U.S. Cl. 303—110 18 Claims



1. In a brake fluid pressure control apparatus for a vehicle having at least one wheel and a brake for the wheel including:

(A) a fluid pressure control valve device arranged between a master cylinder and a wheel cylinder of said brake for the wheel, said fluid pressure control valve device receiving control signals of a control unit measuring the skid condition of the wheel to control the brake fluid pressure to said wheel cylinder;

(B) a hydraulic reservoir which, when the brake fluid pressure to said wheel cylinder is decreased with control of said fluid pressure control valve device, reserves the brake fluid discharged through said fluid pressure control valve device from said wheel cylinder;

(C) a pressure fluid supply conduit connecting said master cylinder with said fluid pressure control valve device;

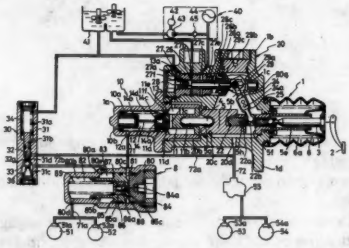
(D) a fluid pump for returning the brake fluid from said hydraulic reservoir into said pressure fluid supply conduit; and

(E) a valve apparatus arranged in a conduit connecting the discharging side of said fluid pump with said master cylinder side, in said pressure fluid supply conduit, said valve apparatus taking a first position for free communicating with both of said sides and a second position for cutting off the fluid flow from said discharging side of the fluid pump towards said master cylinder side; the improvements in which said valve apparatus normally takes said first position, and during anti-skid control, takes said first position continuously for a certain time depending on the control time of the fluid pressure decrease and continuously for another certain time depending on the control time of increasing again the fluid pressure after the fluid pressure decrease, and takes said second position continuously for times other than said certain times.

4,986,613
HYDRAULIC BRAKING SYSTEM FOR AN AUTOMOTIVE VEHICLE

Michiharu Nishii, Toyota; Genji Mizuno, Toyoake; Yoshihisa Nomura, Toyota; Masahiko Kato, Nagoya; Kenji Shirai, Mishima, and Junichi Tanoue, Susono, all of Japan, assignors to Aisin Seiki Kabushiki Kaisha, Kariya and Toyota Jidosha Kabushiki Kaisha, Toyota, both of, Japan

Filed Jul. 28, 1989, Ser. No. 386,274
Claims priority, application Japan, Jul. 30, 1988, 63-191474
Int. Cl.[5] B60T *13/14*
U.S. Cl. 303—114 13 Claims



1. A hydraulic braking system for an automotive vehicle comprising:

a power source for generating a hydraulic power pressure;

a reservoir for storing an amount of brake fluid;

a master cylinder for introducing said brake fluid thereinto from said reservoir and generating a hydraulic braking pressure in response to operation of a manually-operated member;

a hydraulic booster for actuating said master cylinder by said hydraulic power pressure supplied from said power source in response to operation of said manually-operated member;

a plurality of wheel brake cylinders for braking respective road wheels, said wheel brake cylinders being divided into a first group of wheel brake cylinders communicating with said master cylinder through a first hydraulic circuit and a second group of wheel brake cylinders communicating with said hydraulic booster through a second hydraulic circuit;

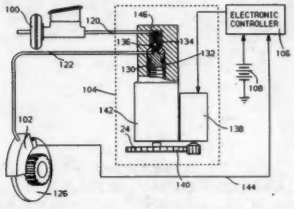
an auxiliary cylinder disposed in said first hydraulic circuit for applying said hydraulic braking pressure from said master cylinder directly to said first group of wheel brake cylinders in an inoperative condition of said auxiliary cylinder and increasing said hydraulic braking pressure applied to said first group of wheel brake cylinders in response to operation of said manually-operated member in an operative condition of said auxiliary cylinder, said operative condition being made when one of said hydraulic power pressure generated by said power source and a hydraulic pressure generated by said hydraulic booster is less than said hydraulic braking pressure by a predetermined difference; and

control means connected to said auxiliary cylinder for allowing said auxiliary cylinder in said operative condition thereof only when one of hydraulic pressures generated by said power source, said hydraulic booster and said master cylinder is less than a predetermined value.

4,986,614
MOTOR-DRIVEN ANTILOCK BRAKE PRESSURE MODULATOR HAVING DIFFERENTIAL MOTOR PERFORMANCE CHARACTERISTICS

Dennis J. Ricker, Huber Heights, and Richard L. Foster, Beavercreek, both of Ohio, assignors to General Motors Corporation, Detroit, Mich.

Filed Aug. 10, 1989, Ser. No. 392,162
Int. Cl.[5] B60T *8/58*
U.S. Cl. 303—115 1 Claim



1. A vehicle anti-lock brake system comprising:

pressure modulator means having an armature displaceable for increasing and decreasing a fluid brake pressure;

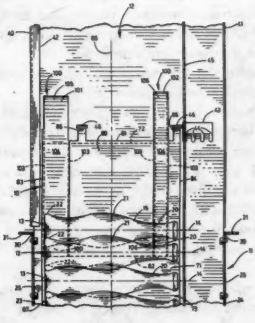
a motor driven actuator connected to said pressure modulator means for regulating the displacement of said armature, the motor having a set of windings which are electrically energizeable to develop torque and speed characteristics determined by such energization; and

control means effective (1) when an increase in said fluid brake pressure is desired for energizing a relatively large number of said windings so as to maximize said torque characteristic, and (2) when a decrease in said fluid brake pressure is desired for energizing a relatively small number of said windings so as to maximize said speed characteristic, thereby to provide a direction dependent differential torque/speed characteristic.

4,986,615
VENDING APPARATUS

Larry E. Hieb, Fresno; Gregory A. Petrie, Madera, and Daniel S. Carter, Clovis, all of Calif., assignors to The Vendo Company, Fresno, Calif.

Filed Oct. 17, 1988, Ser. No. 258,896
Int. Cl.[5] B65D *83/04*
U.S. Cl. 312—45 5 Claims



1. In combination with a vending machine having a staggered stack column containing a plurality of staggered containers, each container having a recess of a predetermined depth, a ramp operable to urge containers within said column into more

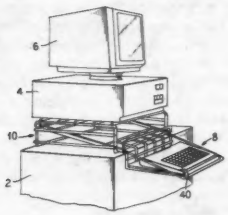
nearly single file, vertically aligned relation within the column, a vending apparatus comprising a substantially rigid member having a predetermined operable thickness equal to or greater than said predetermine depth of the recess of each container; and means for mounting said member on the ramp in substantially fixed, nonresilient relation in substantially vertical alignment with said recesses of the containers in said column for engagement of the member with the containers within the recesses thereof to reduce resistance to passage of the containers along the ramp by releasing portions of the containers from resistant contact with the ramp.

4,986,616

WIRE DROP KEYBOARD DRAWER

Robert H. Chang, Des Plaines, and Peter A. Hayman, Bensenville, both of Ill., assignors to RC International, Inc., Elk Grove Village, Ill.

Filed Dec. 28, 1989, Ser. No. 458,512
Int. Cl.[5] A49B *21/00*
U.S. Cl. 312—208 **8 Claims**



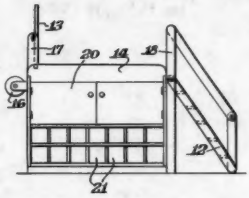
1. A computer support and keyboard drawer comprising:
an enclosure for resting on a surface and supporting a computer body thereon and having a front, a back, a pair of sides and a top;
track means associated with the enclosure between the front and rear thereof;
drawer means operatively associated with said track means for carrying a computer keyboard and movable between a retracted storage position within the enclosure and an extended use position forward of the enclosure;
wherein the improvement comprises:
said enclosure, track means and drawer means being substantially formed of wires;
said track means being pivotally connected to the enclosure whereby said track means are positioned within the enclosure, slope forwardly and downwardly;
said track means including abutment means adjacent the forward end thereof for maintaining said drawer means associated with the track means in the use position;
said drawer means being extendable to a position forwardly and below the enclosure for use; and
wherein:
said side members have interconnection means;
said top member is constructed to interfit with said interconnection means;
front and rear leg members, each constructed to extend between said side members and interfit with said interconnection means; and
a pair of elastomeric feet mounted on each of said front and rear leg members.

4,986,617

PSYCHOLOGICALLY STIMULATING CHANGING APPARATUS

Laura P. McConkey, Wilmington, Del., assignor to University of Delaware, Newark, Del.

Filed Jul. 12, 1985, Ser. No. 754,325
Int. Cl.[5] A47B *83/00*
U.S. Cl. 312—237 **8 Claims**



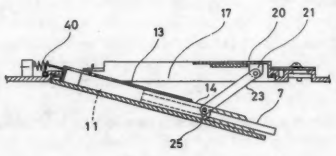
1. A psychologically stimulating changing table for a child comprising:
a. an elevated platform for positioning a child for changing; and
b. means combined with said platform for engaging the attention of the child during the changing operation and thereby obtaining the cooperation of the child in the changing process, said means including a mirror at one end of and facing along the length of the platform so that the child can see himself during changing and can assist in the same.

4,986,618

MEMORY CARD STORAGE DEVICE

Hiroshi Wakatsuki, Tokyo, Japan, assignor to Kabushiki Kaisha TOPCON, Tokyo, Japan

Filed Jun. 8, 1989, Ser. No. 363,096
Claims priority, application Japan, Jul. 1, 1988, 63-162475
Int. Cl.[5] A47B *81/00*
U.S. Cl. 312—276 **4 Claims**



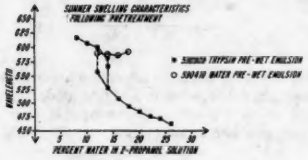
1. A memory card storage device adapted to be used in electronic apparatus using memory cards, which device comprises a main body case having an opening, a lid having movable end and a pivot end rotatably joined to said case so as to cover said opening and having a case portion formed on its inner surface, a card connector slidably installed in the case portion, said card connector being able to receive a memory card, a revolving link having a first end and a second end pivotally connected to a part of said main body case at said first end near said movable end, said second end of said revolving link being connected to said card connector whereby the action of opening the lid causes said revolving link to revolve and thereby cause said card connector to slide in the lid to push the memory card.

4,986,619

HOLOGRAPHIC COLOR CONTROL SYSTEMS

Julie L. Walker, Waitsfield, Vt., and Stephen A. Benton, Lincoln, Mass., assignors to Massachusetts Institute of Technology, Cambridge, Mass.

Filed Oct. 30, 1989, Ser. No. 429,203
Int. Cl.[5] G03H *1/28*
U.S. Cl. 350—3.61 17 Claims



12. In a method of recording pseudocolor holograms by exposing a polymeric emulsion to a plurality of color separation images while the volume of the emulsion is varied by swelling to form a set of superimposed holographic images having different reconstruction wavelengths, the improvement comprising:

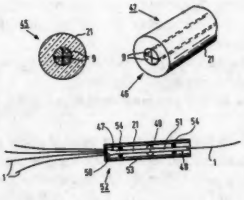
pretreating the polymeric emulsion with an enzymatic agent to reduce swelling anomalies.

4,986,620

PASSIVE FIBER/OPTIC COMPONENT

Adrianus P. Severijns; Petrus J. W. Severin, and Cornelus H. M. Van Bommel, all of Eindhoven, Netherlands, assignors to U.S. Philips Corp., New York, N.Y.

Division of Ser. No. 853,309, Apr. 17, 1986, Pat. No. 4,698,084.
This application May 13, 1987, Ser. No. 49,621
Claims priority, application Netherlands, Apr. 19, 1985, 8501147
Int. Cl.[5] G02B *6/26*
U.S. Cl. 350—96.15 12 Claims



1. A passive fiber optic component comprising:

a glass core having a refractive index and having a substantially circular cross-section;

a glass cladding surrounding the core, said cladding having a refractive index less than the refractive index of the core and having a substantially circular cross-section; and

at least two optical fibers optically coupled to the core, each of said fibers having end portions with reduced cross-sections;

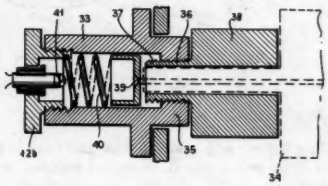
wherein the glass core comprises end portions of the optical fibers fused together to form a solid glass core with no spaces between the fiber end portions, the fused end portions collectively having circular cross-section the diameter of which is substantially equal to the diameter of the core of one of said at least two optical fibers.

4,986,621

OPTICAL HEAD ADAPTED TO RECEIVE A LIGHT GUIDE PLUG

Gustav Gamerdinger, Ammerbuch, Fed. Rep. of Germany, assignor to Wandel & Goltermann GmbH & Co., Eningen, Fed. Rep. of Germany

Filed Aug. 15, 1989, Ser. No. 394,077
Claims priority, application Fed. Rep. of Germany, Aug. 20, 1988, 3828318
Int. Cl.[5] G02B *6/36*
U.S. Cl. 350—96.2 8 Claims



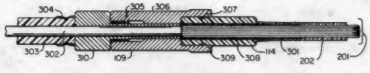
1. An optical head comprising a rear part provided with a photoelectric converter disposed along an axis, an intermediate part surrounding said axis, a front part forming a socket for a light guide plug aligned with said axis, and a diaphragm in said intermediate part having an aperture in said diaphragm lying along said axis, and a spring pressing said diaphragm against a front end of said plug upon insertion of said plug into said socket, said diaphragm having a conical opening extending rearwardly from said aperture to a rear wall of said diaphragm turned toward said converter, said opening having a mirrored surface extending from said aperture to said rear wall, said rear wall and means supporting said diaphragm for axial movement being provided with a light absorbent coating in said head.

4,986,622

FIBER OPTIC LIGHT TRANSMISSION APPARATUS

Miguel Martinez, 1880 W. Sunset Knoll La., Tucson, Ariz. 85704

Filed Jun. 8, 1989, Ser. No. 363,214
Int. Cl.[5] G02B *6/26;* F21V *7/04;* A61B *1/06*
U.S. Cl. 350—96.15 31 Claims



1. In a light transmission system having a high thermal output light source, an improved light transmission apparatus comprising:

heat sensitive light conductor means having an input with a first optical cross-section and an output for transmitting light applied to said input to said output; and

means for optically coupling and thermally decoupling said input of said heat sensitive light conductor means to the high thermal output light source, said coupling means having a second optical cross-section no greater than said first optical cross-section coupled to said input of said heat sensitive light conductor means.

4,986,623

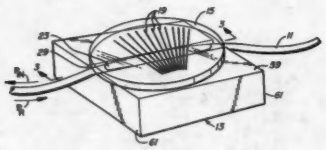
BROADBAND TUNABLE IN-LINE FILTER FOR FIBER OPTICS

Wayne V. Sorin, Mountain View, Calif., assignor to Hewlett-Packard Company, Palo Alto, Calif.

Continuation of Ser. No. 4,997, Jan. 20, 1987, abandoned. This application May 15, 1989, Ser. No. 355,144

Int. Cl.[5] G02B 6/26, 6/34

U.S. Cl. 350—96.15 16 Claims



1. A filter for use with optical fibers, said filter comprising:

a grating including plural elongated regions and plural ridges,

said elongated regions sharing a common predetermined width, said elongated regions sharing a common predetermined length,

each region intersecting plural of said ridges to define a series of ridge segments, each series so defined extending lengthwise of the defining region, each ridge segment of each said series extending substantially widthwise across the region,

each region being characterized by a substantially constant ridge-segment pitch, with a first region having a different pitch from at least a second region;

coupling means for arranging said grating with respect to an optical fiber so that the evanescent field of light being transmitted through said fiber can substantially interact with said grating, and so that the intersection of said grating and such an evanescent field can be substantially contained within at least one of said regions; and

positioning means for moving said grating relative to said fiber so that at one position said first region can substantially contain the intersection of said grating and the evanescent field of light being transmitted through said fiber, and so that at another position said second region can substantially contain the intersection of said grating and the evanescent field of light being transmitted through said fiber.

4,986,624

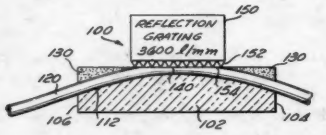
OPTICAL FIBER EVANESCENT GRATING REFLECTOR

Wayne V. Sorin, and Herbert J. Shaw, both of Stanford, Calif., assignors to The Board of Trustees of the Leland Stanford Junior University, Stanford, Calif.

Continuation of Ser. No. 754,271, Jul. 15, 1985, abandoned. This application Jan. 20, 1988, Ser. No. 147,095

Int. Cl.[5] G02B 6/34

U.S. Cl. 350—96.19 19 Claims



1. An intermode coupling apparatus for coupling an optical signal travelling in a first mode of a multimode optical fiber to a second mode of said fiber, said optical signal having a vacuum wavelength (λ_0), said apparatus comprising:

a length of multimode optical fiber having an inner core and an outer cladding and having a facing surface on said cladding in close proximity to said core such that an evanescent field of said optical signals penetrates said facing surface; and

a periodic grating structure on said cladding facing surface within the evanescent field of said optical signal propagating in said first mode, said grating structure having a periodicity Λ in accordance with the following expression:

$$\frac{1}{\Lambda} = \frac{n_{m1}}{\lambda_0} + \frac{n_{m2}}{\lambda_0}$$

wherein n_{m1} is the effective refractive index of the optical fiber for light propagating in said first mode and n_{m2} is the effective refractive index of the optical fiber for light propagating in said second mode.

4,986,625

OPTICAL FIBER CONNECTOR WITH RETAINER

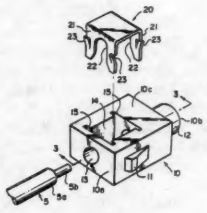
Hiromi Yamada, Yokosuka; Eiji Yoshida, Sagamihara, and Kenji Takahasi, Machida, all of Japan, assignors to AMP Incorporated, Harrisburg, Pa.

Continuation of Ser. No. 241,000, Sep. 6, 1988, abandoned, which is a continuation of Ser. No. 80,516, Jul. 27, 1987, abandoned. This application Aug. 7, 1989, Ser. No. 391,642

Claims priority, application Japan, Dec. 26, 1985, 60-299661; Mar. 31, 1986, 61-074099

Int. Cl.[5] G02B 6/36

U.S. Cl. 350—96.20 20 Claims



1. A connector for connection to an optical cable constructed with an outer jacket encircling an optical fiber, the connector comprising;

a housing having an axially oriented passageway for receiving an optical cable,

recess means in the housing communicating with the passageway,

retaining means for retaining an optical cable to be received by the passageway, said retaining means comprising a plate having a slot therein for engagement with said optical cable, and constructed to be driven into the recess means and to extend partially into the passageway and to penetrate said optical cable, where said slot has a lateral dimension intermediate the diameters of said optical fiber and said outer jacket to engage said optical cable while avoiding compression of said optical fiber, and positive securing means on the retaining means for being secured to the housing within the recess means, where said positive securing means has a resilient projection provided adjacent said slot and adapted to interengage with a laterally disposed wall of said recess means, the resilient projection extends from the positive securing means in a direction which is essentially perpendicular to the plane of the positive securing means, such that as the resilient projection is resiliently deformed, the resilient deformation will occur in a plane which is perpendicular to the plane of the positive securing means, thereby insuring that the deformation of the resilient projection will not cause

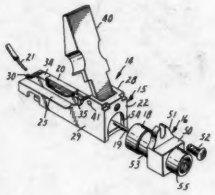
the positive securing means to be moved into said optical cable.

4,986,626

OPTICAL FIBER TERMINATION MODULE

Ronald G. Bossard, Austin, Tex., assignor to Minnesota Mining and Manufacturing Company, St. Paul, Minn.

Filed Aug. 15, 1989, Ser. No. 394,137
Int. Cl.[5] G02B 6/26
U.S. Cl. 350—96.20 12 Claims



1. An optical fiber termination module for use in terminating a cabled optical fiber to a connector comprising:

an optical fiber connector coupling and a single connector plug connected to one end of a length of optical fiber and joined to said coupling.

an optical fiber splice having opposite open ends for making connection between a second end of said length of optical fiber and the free end of an optical fiber from a cable, and

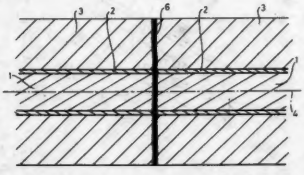
support means for supporting said coupling and said splice in juxtaposition, said support means comprising an end wall for supporting said coupling in fixed position thereon and a base joined directly to said end wall and extending away from the end wall, said base including magazine means for supporting said splice in close spaced generally axial alignment with said coupling with said second end of said length of optical fiber in said splice.

4,986,627

METHOD FOR CONNECTING OPTICAL FIBRES WITHOUT FRESNEL REFLECTION AND SYSTEM THUS DETAINED, VARIABLE OPTICAL ATTENUATOR AND SYSTEM USING THIS ATTENUATOR TO MEASURE THE EFFECT OF THE REFLECTION COEFICIENT ON AN OPTICAL LINE

Daniel Boscher, Trebeurden; René Le Marer, Tregastel, and Gabrielle Perrin, Lannion, all of France, assignors to Etat Francais (Centre National d'Etudes des Telecommunications), Issy les Molineaux, France

Filed Jun. 8, 1989, Ser. No. 363,588
Claims priority, application France, Jun. 10, 1988, 88 07788; Feb. 22, 1989, 89 02290
Int. Cl.[5] G02B 6/38
U.S. Cl. 350—96.21 23 Claims



10. Optical system comprising two optical fibres which have been rough polished, steeped in a concentrated solution of hydrofluoric acid and then aligned and connected with the use of an index matching material, characterised in that the interface 5 of the optical fibres has cracks of an average width of 1 to 2μ generated while said fibers were being steeped in said concentrated solution in the hydrofluoric acid solution.

4,986,628

LIGHT GUIDE DEVICE FOR PHOTOTHERAPY

Alexandr S. Lozhenko, Nadsonovsky tupik, 5, kv. 32, Moskovskaya oblast, Pushkino; Vladimir I. Rechitsky, Peschany pereulok, 8, kv. 18, and Viktor N. Shendalev, ulitsa Vuchetticha, 4, kv. 30, both of Moscow, all of U.S.S.R.

PCT No. PCT/SU88/00164, § 371 Date Apr. 18, 1990, § 102(e) Date Apr. 18, 1990, PCT Pub. No. WO90/02353, PCT Pub. Date Mar. 8, 1990
PCT Filed Aug. 23, 1988, Ser. No. 477,821
Int. Cl.[5] G02B 6/16
U.S. Cl. 350—96.29 1 Claim

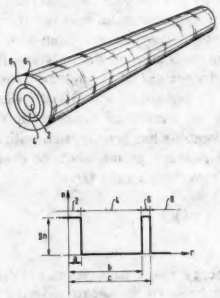
1. A light guide device for phototherapy, comprising an optical fiber light guide having a light guiding strand, a light reflecting envelope and a protective envelope, and a light scattering member provided at a distal end of the optical fiber light guide, characterized in that the protective envelope (4) of the optical fiber light guide (1) protrudes beyond an end face (6) of the distal end of the optical fiber light guide (1) and defines a closed space with the end face (6), and in that the light scattering member (5) is made of an optically turbed medium (7) which is contact with the end face (6) of the optical fiber light guide (1) and which fills up the entire closed space.

4,986,629

MONOMODE OPTICAL FIBER WITH PROTECTION AGAINST TAPPING OF TRANSMITTED INFORMATION, AND A TRANSMISSION METHOD USING SAID FIBER

Jacques Augé, Saint Cheron, and Pascale Beaufumé, Orsay, both of France, assignors to Societe Anonyme dite: Compagnie Generale d'Electricite, Paris, France

Filed Aug. 28, 1989, Ser. No. 400,172
Claims priority, application France, Aug. 26, 1988, 88 11286
Int. Cl.[5] G02B 6/22
U.S. Cl. 350—96.33 10 Claims



1. In an optical fiber having protection against information tapping, the fiber comprising:

a core having a core refractive index for enabling an infor-

mation light wave of given wavelength carrying an information signal to propagate;

information confinement optical cladding surrounding the core monolithically and having an information confinement cladding refractive index less than said core refractive index for confining said information wave in said core and allowing said wave to penetrate only evanescently into said cladding;

an annular waveguide surrounding said information confinement cladding monolithically and having an annular waveguide refractive index which is greater than said information confinement refractive cladding index and enabling an auxiliary lightwave to propagate in said annular waveguide;

auxiliary confinement cladding monolithically surrounding said annular waveguide and having an auxiliary cladding refractive index less than said annular waveguide refractive index for confining said auxiliary wave in said waveguide;

said annular waveguide constituting a multimode waveguide for light having the same wavelength as the light which is monomode-guided by said core in order to constitute said information wave therein, the improvement comprising said annular waveguide thickness much that said auxiliary wave in said annular waveguide has a limited number of propagation modes in the range of 2 to 10 and said core having a diameter such that said information wave in said core has only one propagation mode.

4,986,630

OPTICAL WAVEGUIDES

Peter Herbrechtsmeier, Königstein/Taunus; Jürgen Theis, and Gerhard Wieners, both of Frankfurt am Main, all of Fed. Rep. of Germany, assignors to Hoechst Aktiengesellschaft, Frankfurt am Main, Fed. Rep. of Germany

Filed Apr. 26, 1989, Ser. No. 344,320

Claims priority, application Fed. Rep. of Germany, Apr. 28, 1988, 3814296

Int. Cl.[5] G02B *6/00*

U.S. Cl. 350—96.34 **10 Claims**

1. An optical waveguide having a core/sheath structure whose core comprises a polymer with a refractive index n(c) and whose sheath comprises a polymer with a refractive index n(S), where $n(C)/n(S) > 1.01$, wherein the core comprises a polycarbonate, or a polymer which contains units selected from the group consisting of units which are derived from styrene, from a substituted styrene, from an acrylate, from a methacrylate or from a fluoracrylate, and the sheath comprises a polymer which contains units selected from the group consisting of units which are derived from siloxanes, from 1-olefins, or, based in each case on the polymer, from

30% to 50% by weight of vinylidene fluoride, from

25% to 55% by weight of tetrafluorethylene and from

15% to 25% by weight of hexafluoropropylene, and the optical waveguide has been treated with high energy rays of charged primary particles whose energy has been determined from the formula (I)

$$\log E = (-A + L)/B \qquad (I)$$

in which

E is the energy of the particles in MeV and

L is the thickness of the sheath material in μm, and

A and B are empirically determined parameters which are dependent on the chemical structure of the sheath material and the type of particle used wherein A ranges in value from 0.35 to 1.60, and B ranges in value from 1.30 to 1.75.

4,986,631

AUTOMOTIVE DISPLAY SYSTEM

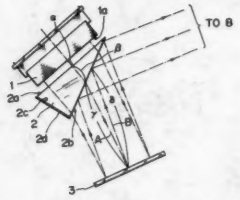
Kunimitsu Aoki; Yasuhiro Miyazawa; Hiroshi Ichikawa, and Yoshiyuki Furuya, all of Susono, Japan, assignors to Yazaki Corporation, Tokyo, Japan

Filed Jul. 5, 1990, Ser. No. 548,522

Claims priority, application Japan, Jul. 17, 1989, 1-083024; Feb. 13, 1990, 2-011931[U]

Int. Cl.[5] G02B *17/04*

U.S. Cl. 350—112 **4 Claims**



1. An automotive display system for a vehicle, comprising:

a display screen;

a reflecting member having a first reflecting surface opposite the display screen of the display; and

a transmissive reflecting member disposed between the display and the reflecting member and having a surface of incidence for receiving light rays emanated from the display, and a second reflecting surface facing said first reflecting surface;

characterized in that the transmissive reflecting member is disposed so that the optical path of the light rays transmitted through the transmissive reflecting member and traveling to the first reflecting surface of the reflecting member and the optical path of the light rays reflected by the first reflecting surface of the reflecting member coincide with each other or form a very small angle therebetween, and the light rays reflected by the first reflecting surface of the reflecting member is reflected again by the second reflecting surface of the transmissive reflecting member toward the driver's seat.

4,986,632

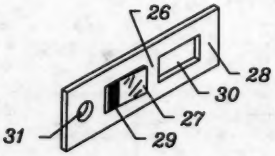
APPARATUS FOR ASSISTING VIEWING OF STEREOSCOPIC DISPLAYS

Rolfe W. Eckmann, 630 5th Ave. S. #204, Edmonds, Wash. 98020

Continuation-in-part of Ser. No. 196,442, May 20, 1988, Pat. No. 4,925,270. This application Sep. 14, 1989, Ser. No. 407,477

Int. Cl.[5] G02B *27/22, 27/02, 7/18*

U.S. Cl. 350—131 **5 Claims**



1. An apparatus for assisting viewing of stereoscopic displays comprising:

a mounting frame comprising a central opening;

a prism mounted wihtin said frame, said prism including a first face and a second face, said second face lying in a

plane that forms an acute angle with said first face, said first and second faces having a transparent viewing window;

a first blinder positioned in close proximity to said prism, said prism and said first blinder positioned on a first end of said frame;

a second blinder positioned on a second end of said frame, said central opening positioned in between said first and second ends of said frame;

adjustment means for varying the distance between the center point of said viewing window and said second blinder;

wherein, said apparatus may be placed before a pair of eyes and said prism induce a three dimensional central image when viewing superimposed images and wherein said adjustment means in combination with said blinder means allows said apparatus to be adjusted to different ocular dimensions of different persons.

4,986,633

MICROLENS AND PROCESS FOR PRODUCING SAME

Mitsuru Ohta, Nagoya, Japan, assignor to Brother Kogyo Kabushiki Kaisha, Japan

Filed Sep. 13, 1988, Ser. No. 243,714

Claims priority, application Japan, Sep. 22, 1987, 62-238457; Sep. 22, 1987, 62-238458

Int. Cl.[5] B29D *11/00*; G02B *1/04*

U.S. Cl. 350—167 **3 Claims**

1. A process for producing a microlens which comprises exposing a layer of a photo reactive composition selected from (i) compositions containing a photopolymerizable monomer and a photopolymerization initiator or (ii) compositions containing a photodecomposable polymer to light through a contact screen, said contact screen having a light transmittance which is changed in a predetermined direction such that the photo reactive composition photoreacts with the light to have an intensity distribution corresponding to the change in the light transmittance of the contact screen; and developing and rinsing the light exposed layer.

4,986,634

BEAM-COMBINING LASER BEAM SOURCE DEVICE

Kazuo Horikawa; Ichirou Miyagawa, and Kouichi Okada, all of Kanagawa, Japan, assignors to Fuji Photo Film Co., Ltd., Kanagawa, Japan

Filed Aug. 25, 1989, Ser. No. 401,903

Claims priority, application Japan, Aug. 26, 1988, 63-212235; Aug. 26, 1988, 63-212236

Int. Cl.[5] G02B *27/14, 7/02*

U.S. Cl. 350—174 **9 Claims**

1. A beam-combining laser beam source device which comprises:

(i) a plurality of laser beam sources,

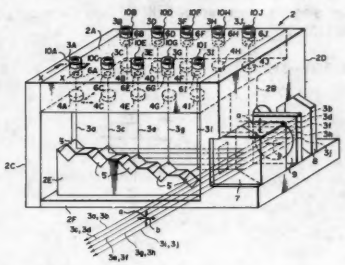
(ii) collimator optical systems respectively positioned in optical paths of laser beams which are radiated from the laser beam sources, each of said collimator optical systems being constituted of a first lens section and a second lens section,

(iii) optical path adjusting elements respectively positioned in the optical paths of the laser beams in order to radiate the laser beams along optical paths parallel and close to one another, and

(iv) a support member which supports said laser beam sources, said collimator optical systems, and said optical path adjusting elements,

wherein each said laser beam source and the corresponding first lens section are combined into a laser beam source unit and mounted on said support member, the positions of said laser beam source and said first lens section having been adjusted with respect to each other, and

said second lens section corresponding to said laser beam



source unit mounted on said support member with the position of said second lens section being adjusted with respect to the position of said laser beam source unit in a plane which is normal to the optical axis of said laser beam source unit.

4,986,635

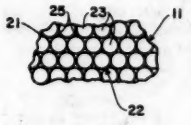
HIGH EFFICIENCY NONLINEAR KERR EFFECT FILTER

Robert J. Spry, Tipp City, Ohio, assignor to The United States of America as represented by the Secretary of the Air Froce, Washington, D.C.

Filed Oct. 31, 1986, Ser. No. 925,858

Int. Cl.[5] G02B *5/24*

U.S. Cl. 350—311 **11 Claims**



1. An optical filter for selectively blocking radiation of preselected wavelength, comprising:

(a) a colloidal suspension of an optical medium and a multiplicity of microspheres of having preselected diameter in the range of from about 10 to about 1000 nanometers supported within said medium in a substantially regular three dimensional array;

(b) said microspheres comprising a first material having a first index of refraction which varies with incident electric field according to a first relationship;

(c) said medium comprising a second material having a second index of refraction which varies with incident electric field according to a second relationship different and divergent from said first relationship; and

(d) wherein at least one of said first relationship and said second relationship is nonlinear and wherein said first index of refraction is substantially equal to said second index of refraction in the absence of incident radiation on said suspension.

4,986,636

VIEWING GLASS FOR VACUUM APPARATUS

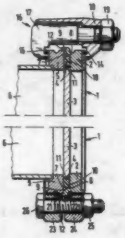
Franz-Peter Contzen, and Katrin Wilmers, both of Cologne, Fed. Rep. of Germany, assignors to Leybold AG, Fed. Rep. of Germany

Filed Aug. 30, 1989, Ser. No. 400,704

Claims priority, application Fed. Rep. of Germany, Sep. 12, 1988, 8811508[U]

Int. Cl.[5] B65D *25/54*; G02B *7/00*

U.S. Cl. 350—319 8 Claims



1. A viewing glass for a vacuum apparatus comprising the following:

a transparent pane having an outer edge;

a first flange in which said pane is mounted;

a second flange cooperating with said first flange to mount said pane therebetween;

an O-ring surrounding said pane and mounted between said pane and said first flange to produce a vacuum-tight seal therebetween, said O-ring having a cross-sectional profile resembling a parallelogram;

wherein said first flange comprises a sealing surface including a concave step having a substantially axially extending section and radially extending section;

wherein said substantially axially extending section is in direct contact with said O-ring;

wherein said radially extending section is in direct contact with said O-ring and said pane; and

wherein said concave step of said first flange, said second flange, and said outer edge of said pane cooperate to form a cross-sectional parallelogram corresponding to said cross-sectional profile of said O-ring.

4,986,637

ARRANGEMENT OF PICTURE ELEMENTS FOR COLOR DISPLAY

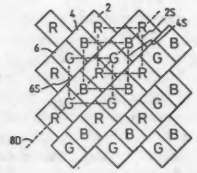
Hidefumi Yamaguchi, Fujisawa, Japan, assignor to International Business Machines Corporation, Armonk, N.Y.

Filed Jul. 13, 1988, Ser. No. 218,731

Claims priority, application Japan, Aug. 6, 1987, 62-195435

Int. Cl.[5] G02F *1/133*; G09G *1/28*

U.S. Cl. 350—339 F 28 Claims



1. A color display comprising:

first, second and third color picture elements;

means for driving each said picture element independently;

wherein said first, second and third color picture elements are sequentially arrayed along the diagonals of first, second and third substantially square-shaped quadrangles;

said picture elements including at least one side aligned substantially parallel to said diagonals; and

said quadrangles coincide with each other, such that said first, second and third color picture elements are respectively positioned at the vertices of said first, second and third quadrangles.

4,986,638

LIQUID CRYSTAL ELECTRO-OPTICAL DEVICE

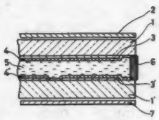
Shunpei Yamazaki, Tokyo, and Masahiko Sato, Atugi, both of Japan, assignors to Semiconductor Energy Laboratory Co., Ltd., Kanagawa, Japan

Filed Sep. 19, 1988, Ser. No. 245,794

Claims priority, application Japan, Sep. 18, 1987, 62-234196; Jun. 24, 1988, 63-157703; Jun. 24, 1988, 63-157704

Int. Cl.[5] G02F *1/13*

U.S. Cl. 350—341 6 Claims



1. A liquid crystal device comprising:

a pair of substrates;

a chiral smectic liquid crystal layer interposed between said substrates;

an electrode arrangement for defining a plurality of cell regions in said liquid crystal layer in matrix form having a plurality of rows and columns and for applying an electric field to each of said cell regions; and

an orientation control surface formed on at least one inside surface of said substrates for orienting the molecules of said liquid crystal layer in parallel with the columns,

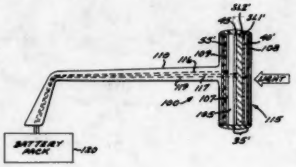
wherein each cell region consists of a plurality of individual micro-domains in each of which liquid crystal molecules are aligned in accordance with one direction which is different from adjacent micro-domains contiguous thereto, and the condition of said liquid crystal within each micro-domain is changed in accordance with conical movement of the liquid crystal molecules which is caused by an electric field applied thereto, but the caused by an electric field micro-domain takes place individually without influence from the condition of adjacent micro-domains and wherein the dimension of said micro-domains with respect to the direction of said rows is several microns.

4,986,639

EYE PROTECTION DEVICE AGAINST BROADBAND HIGH INTENSITY LIGHT

David B. Chang, Tustin, and Brian M. Pierce, Moreno Valley, both of Calif., assignors to Hughes Aircraft Company, Los Angeles, Calif.

Filed Jan. 13, 1989, Ser. No. 296,643
Int. Cl.[5] G02B 5/23; G02F 1/01, 1/07
U.S. Cl. 350—354 22 Claims



1. An eye protection device against broadband high intensity light, which includes a fast response protection component, comprising:

an assembly comprising first and second transparent electrode members, sandwiching first and second semiconductor layers;

said first layer comprising a layer of a first semiconductor material having a characteristic threshold energy less than that of incident high intensity light, and wherein the recombination time of excited electrons in the first layer is greater than the time needed to sweep these electrons into the second layer, and wherein the thickness of the first layer is approximately equal to one absorption length for said first semiconductor material; and

wherein said second layer comprises a semiconductor material having a characteristic threshold energy greater than that of incident high intensity light, and wherein the width of the second layer is large enough so that a metal region of a skin depth can form in the second layer; and

a filter disposed on a surface of one of said transparent electrodes adjacent the eye for attenuating light at a frequency of the recombination radiation corresponding to the characteristic band gap energy of the second layer semiconductor material; and

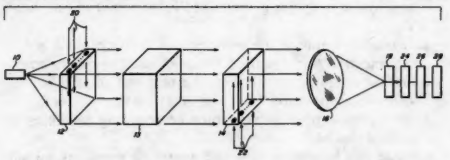
means for developing a sufficient electric field across the first and second layers such that electrons in the conduction band of the first layer experience no significant barrier for injection into the conduction band of the second layer.

4,986,640

HIGH ACCURACY DIGITAL ACOUSTO-OPTIC MATRIX COMPUTER

Ravindra A. Athale, Annandale, Va., assignor to The United States of America as represented by the Secretary of the Navy, Washington, D.C.

Filed Feb. 22, 1985, Ser. No. 704,454
Int. Cl.[5] G02F 1/11; G06E 3/00
U.S. Cl. 350—358 19 Claims



1. An apparatus for performing at least 10^8 operations per second of vector-matrix multiplication with 16-bit digital accuracy comprising:

a first multichannel acousto-optic device which receives impulses representing a matrix (M×N) through its channels in a first acoustic propagation direction;

means for generating coherent light illuminating the first acousto-optic device;

a second multichannel acousto-optic device of the same type as the first acousto-optic device, the second acousto-optic device receiving impulses representing a vector (N×1) through its channels is an acousto-propagation direction opposite to the first acoustic propagation direction; said second acousto-optic device being aligned parallel to and imaged at a 1:1 correspondence on the first acousto-optic device so that any light passing through the first acousto-optic device from the light means will strike the second acousto-optic device, and

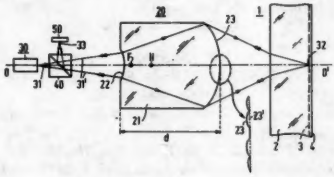
a single-element high-speed photodetector.

4,986,641

RETROFOCUS OBJECTIVE LENS AND OPTICAL SCANNING DEVICE PROVIDED WITH SUCH A LENS

Josephus J. M. Braat, Eindhoven, Netherlands, assignor to U.S. Philips Corp., New York, N.Y.

Filed Sep. 7, 1989, Ser. No. 404,934
Claims priority, application Netherlands, May 19, 1989, 8901245
Int. Cl.[5] G02B 13/18, 27/44
U.S. Cl. 350—432 13 Claims



1. An objective lens for focusing a diverging radiation beam into a diffraction-limited radiation spot, comprising a single lens body of transparent material having a first refractive surface on the object side and a second refractive surface on the image side, characterized in that both the first and the second refractive surfaces, viewed from the object side, are concave, in that the focal length is considerably smaller than its thickness along the axis and in that the second refractive surface is aspherical.

4,986,642

OBJECTIVE LENS SYSTEM FOR ENDOSCOPES AND IMAGE PICKUP SYSTEM EQUIPPED WITH SAID OBJECTIVE LENS SYSTEM

Akira Yokota, Kanagawa; Hiroyuki Fukuda, and Susumu Takahashi, both of Tokyo, all of Japan, assignors to Olympus Optical Co., Ltd., Tokyo, Japan

Filed Nov. 18, 1988, Ser. No. 272,991
Claims priority, application Japan, Nov. 20, 1987, 62-291801; Feb. 5, 1988, 63-023963; Apr. 22, 1988, 63-098164
Int. Cl.[5] G02B 13/18
U.S. Cl. 350—432 51 Claims

1. An objective lens system for endoscopes comprising:

a front lens unit having negative refractive power,

a rear lens unit having positive refractive power,

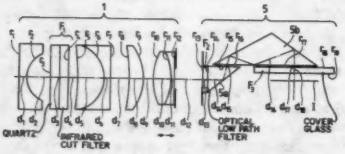
said objective lens system having a long back focal length and satisfying the following condition (1):

$$|f_1/f| < 3.8 \quad (1)$$

wherein the reference symbol f, represents focal length of the front lens unit and the reference symbol f designates focal length of the objective lens system as a whole,

in combination with an image pick-up system including:

an image sensor arranged obliquely or parallel relative to the optical axis of said objective lens system, and



an optical path deflecting system arranged between said objective lens system and said image sensor,

said image pickup system satisfying the following condition (7):

$$5° \leqq \tan^{-1}\frac{I}{SK - EX} \leqq 35° \qquad (7)$$

wherein the reference symbol I represents height of image, the reference symbol SK designates the distance from the final lens surface of the objective lens system to the image plane determined by the paraxial theory and the reference symbol EX denotes the distance from said final lens surface to the exit pupil.

4,986,643

LENS SYSTEM CAPABLE OF CLOSE-UP PHOTOGRAPHING

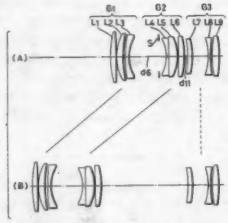
Keiji Moriyama, Yokohama, Japan, assignor to Nikon Corporation, Tokyo, Japan

Filed Jul. 3, 1989, Ser. No. 374,866

Claims priority, application Japan, Jul. 8, 1988, 63-170118

Int. Cl.[5] G02B *9/12*

U.S. Cl. 350—477 **16 Claims**



1. A lens system capable of close-up photographing comprising, in succession from the object side, a first lens group having a positive refractive power, a second lens group having a positive refractive power, and a third lens group having a negative refractive power, said first lens group and said second lens group being moved relative to each other for focusing from infinity to a close distance so that the spacing between said first lens group and said second lens group is reduced and the spacing between said second lens group and said third lens group is enlarged, said first and second lens groups being designed to satisfy the following condition:

$$1.0 < \Delta S_2/\Delta S_1 < 1.4,$$

where

ΔS_1: the amount of movement of said first lens group from the infinity photographing condition to a state in which an object at any distance is photographed.

ΔS_2: the amount of movement of said second lens group from the infinity photographing condition to a state in which an object at any distance is photographed.

4,986,644

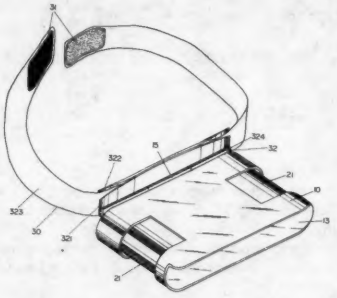
WEARABLE BINOCULARS

John J. Yang, 2416 W. 231 St., Torrance, Calif. 90501

Filed Sep. 11, 1989, Ser. No. 405,305

Int. Cl.[5] G02B *23/18*

U.S. Cl. 350—548 **1 Claim**



1. A pair of wearable binoculars comprising:

a housing having a shape substantially in the form of an H having a hollow interior, an inner surface and an outer surface, and an outer and an inner end;

a plurality of longitudinally extending parallel grooves on upper and lower inner surfaces of the housing, the grooves on the upper surface corresponding with those on the lower surface and extending in the direction of the inner and outer ends;

a pair of control boxes within the hollow interior of the housing in opposed spaced relationship, said control boxes being hollow and having front and rear ends and inner and out side portions;

upper and lower flanges extending from said inner side portion of each control box and slidingly engaging in said upper and lower parallel grooves, respectively, for longitudinal sliding movement and for adjustment at right angles to the longitudinal direction of said grooves;

a color film on said outer end of said housing;

an objective lens frame at the front end of each control box;

an objective lens in each objective lens frame;

upper and lower eyepiece grooves in the inner surface at the inner end of said housing extending in a lateral direction transverse to the longitudinal direction of said parallel grooves;

a pair of eyepiece boxes telescopically engaging through said inner ends of said pair of control boxes, said eyepiece boxes being hollow and having inner and outer ends, said outer ends being disposed in the hollow interior of said control boxes;

upwardly and downwardly extending flanges on the rear end of each eyepiece box slidingly engaging in said upper and lower eyepiece grooves at the inner end of said housing;

an eyepiece frame in the inner end of each eyepiece box;

an eyepiece in said eyepiece frame of each eyepiece box;

a tubular coupling member on the rear end of said housing extending upwardly from the outer surface thereof;

a hard plastic plate having tubular coupling members attached thereto;

a hinge pin insertable into said coupling members on said housing and said plastic plate for pivotally coupling said plastic plate to said housing;

an arched soft rubber strip attached to said plastic plate for engagement against a user's forehead; and,

a belt member attached between said plastic plate and said soft rubber strip and having outer ends each having an adjustable adhesive retainer thereon for adjustment to the user's head;

so that said control boxes are manually adjustable laterally by sliding between adjacent longitudinal grooves for adjusting said eyepiece boxes laterally, and manually adjustable longitudinally to adjust the focus of the objective lens with respect to the eyepiece, and the housing is pivotable upwardly substantially 90° with respect to the plastic plate when mounted on a user's head.

4,986,645

GUN SIGHTING TELESCOPE

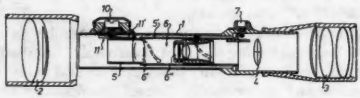
John A. I. Ekstrand, Ocala, Fla., assignor to Interaims Aktiebolag, Malmo, Sweden

PCT No. PCT/SE86/00218, § 371 Date Nov. 9, 1988, § 102(e) Date Nov. 9, 1988, PCT Pub. No. WO87/07004, PCT Pub. Date Nov. 19, 1987

PCT Filed May 9, 1986, Ser. No. 269,788

Int. Cl.[5] G02B *23/00*

U.S. Cl. 350—560 **4 Claims**



1. A gun sighting telescoping a recticle (4) in the object plane of the ocular lens (3), a frame, a device (7) mounted on said frame for adjusting the axial distance between two lens arrangements (6', 6") included in an inner lens system (6) between the ocular lens (3) and the objective lens (2) for changing the magnification factor of the sighting telescope, and at least one device for adjusting the angle of elevation of the sighting telescope in dependence on the adjustment of the magnification factor of the sighting telescope, said elevation angle adjusting device comprising a device consisting of a cam means (11) and a cam follower means (10), one of which is fixed relative to either one of the lens arrangements (6', 6") of the inner lens system, the outer means being fixed relative to said frame (outer tube 1) of the sighting telescope, said cam means and said cam follower means (10, 11) are so arranged that, upon a change of the magnification factor, a change of the distance between the lens arrangements (6', 6") of the inner lens system (6) automatically changes the elevation angle adjustment of the inner lens system and thus the angle between their common center line, i.e. the optical axis, and the corresponding axis of the objective lens (2) and the ocular lens (3) and said ocular lens (3) and said reticle (4) are so arranged relative to the rest of the lens system that upon a change of the magnification factor of the sighting telescope, the image of the reticle has essentially the same size such that a point on the reticle covers substantially the same area on an object whose image in the sighting telescope has been adapted, irrespective of the distance to said object, to a specific size of adjustment of the magnification factor.

4,986,646

ELECTRIC REARVIEW MIRROR DEVICE FOR A VEHICLE

Tadanao Hamamoto; Tadashi Wakiya, and Kazunari Hayashi, all of Aichi, Japan, assignors to Kabushiki Kaisha Tokai Denki Seisakusho, Aichi, Japan

Filed Jul. 12, 1989, Ser. No. 378,803

Claims priority, application Japan, Jul. 13, 1988, 63-174442

Int. Cl.[5] B60R *1/08*; G02B *7/18*

U.S. Cl. 350—637 **8 Claims**

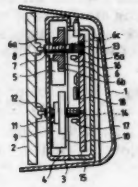
1. An electric rearview mirror system for use in a vehicle, comprising:

a housing supported by said vehicle;

a mirror body mounted turnably in said housing;

means for driving said mirror body in a selected turning direction, said mirror body driving means having spring means connected to said mirror body for absorbing a rotational force of said mirror driving means;

means for detecting a position of said mirror body;



means for storing an output of said position detecting means at a predetermined sampling period; and

means for controlling said mirror body driving means, said controlling means having means for stopping the operation of said mirror driving means whenever an incremental turning of said mirror body is detected in a direction opposite said selected turning direction, said incremental turning being caused by a recoil of said spring means.

4,986,647

DECORATION FOR SPECTACLE FRAMES OF PLASTICS MATERIAL AND A METHOD FOR ITS APPLICATION

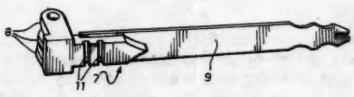
Oreste Blumenthal, Turin, Italy, assignor to Giuseppe Ratti Industria Ottica S.p.A., Turin, Italy

Filed Dec. 30, 1988, Ser. No. 292,153

Claims priority, application Italy, May 25, 1988, 67483 A/88

Int. Cl.[5] G02C *11/02, 1/08, 5/22*

U.S. Cl. 351—51 **11 Claims**



1. A spectacle frame of plastic material having at least one decorative member embedded therein, said spectacle frame comprising a front piece and two side pieces connected to said front piece and each decorative member comprising a shape plate incorporated in at least one of said pieces with an outer face substantially flush with an external surface of said at least one piece, wherein said plate has at least one passage formed therein and opening onto said outer face with each passage filled with the plastic material constituting the frame.

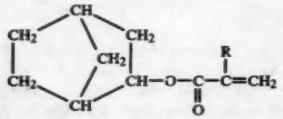
4,986,648

LENS AND OPTICAL DISC BASE PLATE OBTAINED FROM COPOLYMER OF NORBORNYL (METH)ACRYLATE

Akihiro Kobayashi; Toshiyuki Fujita; Takayuki Saito, all of Hitachi; Hiromasa Kawai, Ichihara; Yutaka Hosoi, Mito, and Hideaki Shibata, Chiba, all of Japan, assignors to Hitachi Chemical Company, Ltd., Tokyo, Japan

Continuation of Ser. No. 63,299, Jun. 18, 1987, Pat. No. 4,868,261. This application Dec. 21, 1988, Ser. No. 287,018
The portion of the term of this patent subsequent to Sep. 19, 2006, has been disclaimed.
Int. Cl.[5] G02C 7/04; C08F 220/12
U.S. Cl. 351—160 R 2 Claims

1. A lens obtained by molding an optical resin material as an essential component, said optical resin material comprising a copolymer consisting essentially of one or more unsaturated carboxylic acid esters of the formula:



(I)

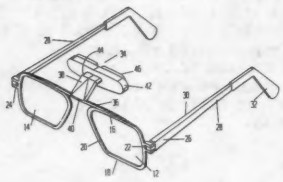
wherein R is hydrogen or a methyl group and at least one other polymerizable unsaturated monomer selected from the group consisting of monofunctional unsaturated carboxylic acid esters, aromatic vinyl compounds, N-alkylmaleimides, N-cycloalkylmaleimides and N-arylmaleimides.

4,986,649

EYEGLASSES FRAME WITH IMPROVED FRONTAL SUPPORT

Lonnie W. Smith, Orange, Calif., assignor to Robert E. Strauss, Santa Ana, Calif.

Filed Oct. 11, 1988, Ser. No. 255,476
Int. Cl.[5] G02C 5/02
U.S. Cl. 351—130 6 Claims



1. In an eyeglass structure having frame means interconnecting right and left ocular frames to support respective ocular lenses with upper frame edges and with laterally supported and pivotally attached temples, the improvement in a frontal support therefor which comprises:

a. at least one support post extending upwardly and rearwardly from said eyeglass structure; and

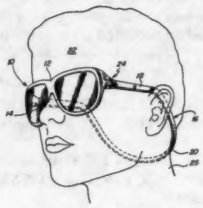
b. a frontal support member carried on the upper end of said support post and constituting the only frontal support to carry the weight of said eyeglass structure and positioned symmetrically about the medium plane of said eyeglasses and above and behind the upper edges of the ocular frames of said eyeglass structure, to rest on the forehead and above the brow of a wearer of said eyeglasses and thereby support the weight of said eyeglass structure.

4,986,650

SUN GLASSES FOR WATER SPORTS

Gene Wilhelmi, 419 Main St., No. 74, Huntington Beach, Calif. 92648

Filed Jun. 9, 1989, Ser. No. 363,696
Int. Cl.[5] G02C 3/00
U.S. Cl. 351—156 7 Claims



1. Sun glasses for use in water sports and like activities wherein the sun glasses comprise:

a pivotal main frame member including a pair of tinted glass members mounted therein;

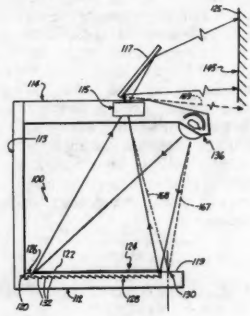
a head band formed from a unitary strap member of semi-hard material having a pair of horizontally disposed side temple members pivotally connected to said main frame member and an integrally formed intermediate bowed section, said bowed section being fixedly arranged in an angularly downward direction from said horizontal side temple members, whereby said bowed section is positioned adjacent the base of the head of a wearer thereof to prevent the inadvertent removal of said sun glasses during a sporting activity and the main frame may be rotated to a horizontal position with respect to the temple members.

4,986,651

OVERHEAD PROJECTOR WITH CENTERLESS FRESNEL LENS REFLECTIVE STAGE

Dennis F. Vanderwerf, St. Paul, Minn., assignor to Minnesota Mining and Manufacturing Company, St. Paul, Minn.

Filed Aug. 4, 1989, Ser. No. 389,534
Int. Cl.[5] G03B 21/132
U.S. Cl. 353—66 16 Claims



1. In an overhead projector having a surface for supporting an image to be projected, an overhead light source for illuminating the image on a reflective stage area of the surface and projection means for focusing and reflecting the illuminated image onto a screen, the improved which comprises:

defining the reflective stage area of the surface by a portion of a Fresnel lens wherein the lens has its optical center

aligned out of and spaced from the reflective stage area of the surface.

4,986,652

COORDINATE GRID FOR A STEREOSCOPIC MEASURING DEVICE

Ilya M. Mogilevsky, skaya ulitsa, 20, kv. 286; Igor A. Vengerov, Seleznevskaya ulitsa, 30, korpus 3, kv. 46; Alexandr G. Gusar, Balaklavsky prospekt, 54, kv. 56, both of, Moscow; Konstantin A. Makarov, poselok Svetly, 27, kv. 9,, Moskovskaya oblast, Noginsky raion, and Alexei E. Chebyshev, Leningradsky prospekt, 7I, kv. 42, Moscow, all of U.S.S.R.

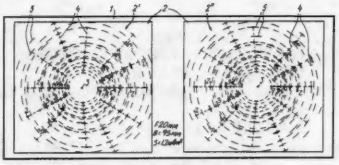
PCT No. PCT/SU89/00093, § 371 Date Dec. 18, 1989, § 102(e) Date Dec. 18, 1989, PCT Pub. No. WO89/10537, PCT Pub. Date Nov. 2, 1989

PCT Filed Apr. 14, 1989, Ser. No. 449,862

Claims priority, application U.S.S.R., Apr. 18, 1988, 4411234

Int. Cl.[5] G01C *11/06*

U.S. Cl. 356—2 **2 Claims**



1. A coordinate grid for a stereoscopic measuring device made in the form of a support (1) carrying a stereophotograph of an image of at least one group of straight lines (4) converging at one point and closed lines interconnecting them, and having divisions, c h a r a c t e r i z e d in that the closed lines are essentially circles (5) the centers of which (O_1, O_2, O_3 . . .) are offset relatively to the point (3) of intersection of the straight lines (4) and also relatively to one another in one and the same radial direction, and each of which corresponds to a definite camera-to-object distance, and all the grid lines are made in the form of dash lines, the lengths (L,l) of the dashes, intervals therebetween and the radii of the circles determine the value of a grid division.

4,986,653

LIGHT WAVE RANGE FINDER

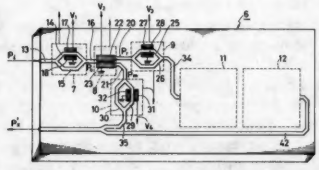
Takashi Yokokura; Nobuo Hori; Hiroaki Shimozono, and Satoru Niimura, all of Tokyo, Japan, assignors to Kabushiki Kaisha Topcon, Tokyo, Japan

Filed Aug. 5, 1988, Ser. No. 228,649

Claims priority, application Japan, Sep. 16, 1987, 62-231796; Sep. 17, 1987, 62-233388; Nov. 8, 1987, 62-200358; Dec. 8, 1987, 62-201134

Int. Cl.[5] G01C *3/08*

U.S. Cl. 356—5 **12 Claims**



1. A coherent light wave range finder having a range finding optical system in which the intensity of a coherent beam of light emitted from a coherent light source is modulated and delivered to an object and a beam of light reflected from the object is received by a light receiving element, a distance to the object being measured based on detection of the phase of the reflected modulated beam of light, comprising:

an optical substrate including a first light intensity modulating portion for modulating the intensity of a coherent beam of light; an optical path changing portion for changing the optical path length of the coherent beam of light between an external range finding optical path and a reference optical path; a first light amount regulating portion for regulating the amplitude of said coherent beam of light guided to the external range finding optical path; and a second light amount regulating portion wherein said first light amount regulating portion and said second light amount regulating portion each includes a wave path that branches into at least two separate wave path branches, at least one of said wave path branches in each of said first and said second light amount regulating portions including an electrode; a directing system for directing said coherent beam of light toward said object; a light receiving system for receiving said beam of light reflected from said object.

4,986,654

METHOD AND APPARATUS FOR CONTACTLESS ACQUISITION OF DATA FOR THE LOCALLY RESOLVED DETERMINATION OF THE DENSITY AND TEMPERATURE IN A MEASUREMENT VOLUME

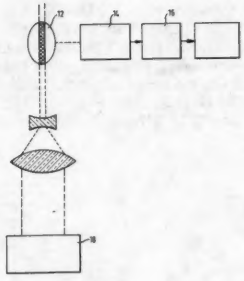
Gerard Meijer, Nijmegen, Netherlands; Peter Andresen, Dransfeld, Fed. Rep. of Germany; Gerd E. A. Meier, Roringen, Fed. Rep. of Germany, and Hans W. Luelf, Goettingen, Fed. Rep. of Germany, assignors to Max-Planck-Gesellschaft . . . e.V., Goettingen, Fed. Rep. of Germany

Filed Mar. 21, 1988, Ser. No. 170,715

Claims priority, application Fed. Rep. of Germany, Mar. 19, 1987, 3709065; Aug. 31, 1987, 3729063

Int. Cl.[5] G01J *5/28;* G01N *21/64;* G01B *9/025*

U.S. Cl. 356—43 **20 Claims**



1. A method for contactless acquisition of data for determining at least one of the parameters density and temperature of a molecular gas within a predetermined volume, said gas containing molecules which collide with each other with a predetermined collision frequency, said method comprising the steps:

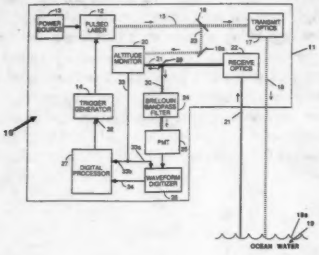
(a) directing laser radiation adapted to excite at least one molecular rotational transition of said gas molecules through said volume to produce excited molecules, and

(b) measuring the density of said excited molecules during a period of time after said excitation step (a) which is substantially shorter than the reciprocal of said collision frequency.

4,986,655
APPARATUS FOR MEASURING DIFFUSE ATTENUATION COEFFICIENT OF SEA WATER

Harold E. Sweeney, Menlo Park; Paul J. Titterton, Palo Alto, and Donald A. Leonard, Cupertino, all of Calif., assignors to GTE Government Systems Corporation, Stamford, Conn.

Filed Nov. 30, 1989, Ser. No. 443,620
Int. Cl.[5] G01N *21/00*; G01J *3/44*
U.S. Cl. 356—73 16 Claims



1. Apparatus for measuring the diffuse attenuation coefficient of ocean water comprising:

pulsed laser means for producing a pulsed output beam having a wavelength λ_o;

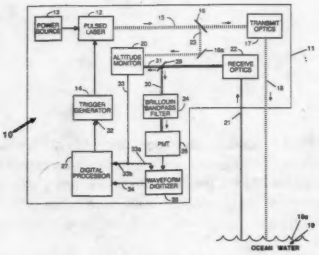
optical transmitter means positioned above said ocean water for directing said pulsed output beam as a probe beam into said ocean water, said probe beam interacting with said ocean water and producing at least Brillouin backscatter signals at the wavelength λ where, $\lambda_o \neq \lambda_1$, propagating generally oppositely to the direction of propagation of said probe beam; and,

optical receiver means positioned above said ocean water for receiving said backscatter signals and for generating therefrom the diffuse attenuation coefficients of said ocean water at the wavelength λ_1.

4,986,656
METHOD OF REMOTELY MEASURING DIFFUSE ATTENUATION COEFFICIENT OF SEA WATER

Harold E. Sweeney, Menlo Park; Paul J. Titterton, Palo Alto, and Donald A. Leonard, Cupertino, all of Calif., assignors to GTE Government Systems Corporation, Stamford, Conn.

Filed Nov. 30, 1989, Ser. No. 443,679
Int. Cl.[5] G01N *21/00*; G01J *3/44*
U.S. Cl. 356—73 9 Claims



1. A remote method of measuring the diffuse attenuation coefficient of ocean water comprising of the steps of:

from an airborne platform over said water generating a pulsed laser probe beam having a wavelength λ_o;

directing said probe beam downwardly into said water thereby causing said probe beam to interact with said water and producing at least backscatter signals at the wavelength λ_1, where $\lambda_1 \neq \lambda_o$, and propagating generally oppositely to the direction of propagation of said probe beam;

receiving at said airborne platform upwelling optical energy including said backscatter signals;

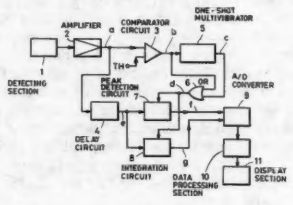
separating out said backscatter signals from said upwelling optical energy; and

analyzing said backscatter signals and generating therefrom the diffuse attenuation coefficient of said ocean water at said wavelength.

4,986,657
APPARATUS FOR ANALYZING PARTICLES USING SCATTERED AND FLUORESCENT LIGHT

Shinichi Ohe, Yokohama, Japan, assignor to Canon Kabushiki Kaisha, Tokyo, Japan

Filed Jul. 20, 1988, Ser. No. 221,596
Claims priority, application Japan, Jul. 31, 1987, 62-192203
Int. Cl.[5] G01N *15/14, 21/64*
U.S. Cl. 356—73 9 Claims



1. An apparatus for analyzing particles, comprising:

irradiation means for irradiating particles in a detecting section;

first receiving means for receiving and photoelectrically converting scattered light from said detecting section, and second receiving means for receiving and photoelectrically converting fluorescent light generated concurrently with said scattered light;

comparator means connected to said first receiving means for comparing a level of signal pulses of said scattered light with a predetermined threshold level and for generating timing pulses from moments at which said signal pulses exceed said threshold level;

pulse generating means connected to said comparator means for generating gate pulses by adding a predetermined period to said timing pulses;

delaying means connected to said first and second receiving means for delaying a photoelectrically converted detecting signal of each of said scattered light and fluorescent light and for generating from each a delayed signal pulse;

measuring means for measuring values, by a selected one of integrating and peak-holding, of each delayed signal pulse outputted from said delaying means during the period of said gate pulses; and

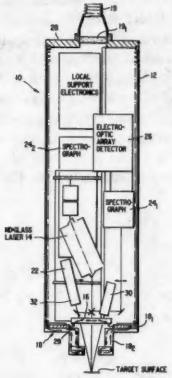
analyzing means for analyzing the particles using the measured values of said scattered light and fluorescent light measured by said measuring means.

4,986,658

TRANSIENT SPECTROSCOPIC METHOD AND APPARATUS FOR IN-PROCESS ANALYSIS OF MOLTEN METAL

Yong W. Kim, Bethlehem, Pa., assignor to Lehigh University, Bethlehem, Pa.

Filed Apr. 21, 1989, Ser. No. 341,748
Int. Cl.[5] G01J *3/443, 3/18;* G01N *21/63*
U.S. Cl. 356—318 **52 Claims**



1. A method for spectroscopic analysis of a molten metal, comprising:

providing a probe including a casing having an open end adapted to be immersed in the molten metal, laser means disposed in said casing for irradiating the surface of the molten metal adjacent the open end with a laser beam of predetermined energy density and focal spot size, and spectroscopic detector means disposed in said casing for detecting spectral components of light emitted from a plasma produced by the laser means;

immersing the open end of the casing into the molten metal;

irradiating the molten metal with a laser beam from said laser means to produce a plasma representative of the composition of the molten metal, said irradiating being performed during immersion of the casing open end into the molten metal; and

detecting spectral components of radiation emitted by the plasma by means of the spectroscopic detector means in the casing and producing signals corresponding to the detected spectral components.

4,986,659

METHOD FOR MEASURING THE SIZE AND VELOCITY OF SPHERICAL PARTICLES USING THE PHASE AND INTENSITY OF SCATTERED LIGHT

William D. Bachalo, Los Altos Hills, Calif., assignor to Aerometrics, Inc., Sunnyvale, Calif.

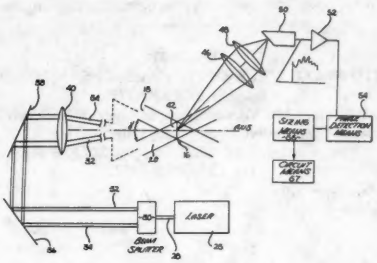
Continuation-in-part of Ser. No. 162,053, Feb. 29, 1988, abandoned. This application Oct. 3, 1989, Ser. No. 416,519
Int. Cl.[5] G01N *15/02*
U.S. Cl. 356—336 **39 Claims**

1. In an apparatus for measuring parameters associated with particles, droplets and the like employing first and second Gaussian laser beams caused to cross to establish an interference pattern forming a sample volume, a method for detecting errors due to mixed components in light scattered by said particles, droplets and the like passing through said interference pattern, comprising the steps of:

(a) generating said first and second Gaussian laser beams and directing said beams to cross at a known angle to form said sample volume;

(b) collecting said light scattered by said particles, droplets and the like passing through said sample volume and determining the phase of said scattered light;

(c) determining the size of said particles, droplets and the like from the phase of said scattered light;



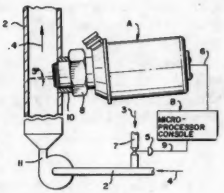
(d) determining the amplitude of said scattered light and comparing said amplitude to predefined upper and lower amplitude limits for the particle size, such that if said amplitude determined is outside said limits an error is detected and said measurement is considered invalid.

4,986,660

STOCK CONSISTENCY TRANSMITTER

James O. Corbett, Eustis, Fla., assignor to The Electron Machine Corporation, Umatilla, Fla.

Filed Apr. 21, 1989, Ser. No. 341,711
Int. Cl.[5] G01N *21/00*
U.S. Cl. 356—342 **29 Claims**



1. An apparatus for determining the amount of particle suspension in a fluid by measuring radiation reflection on the particles, comprising:

(a) means for producing a beam of radiation having at least first and second reflected portions;

(b) means for directing said beam of radiation into the fluid;

(c) first detector means for picking up at least said first portion of said beam of radiation reflected from the particle suspension in the fluid and for generating an output;

(d) second detector means for picking up at least said second portion of said beam of radiation reflected from the particle suspension in the fluid and for generating an output;

(e) said beam having sufficient power so as to penetrate the fluid a sufficient distance to cause said at least first and second reflected portions of said beam to reflect from the particle suspension and impinge on said first and second detectors means, respectively

(f) means for maintaining substantially constant the output of said first detector;

(g) said first and second detector means are disposed for permitting the output of said second detector means to increase relative to the output of said first detector means as the amount of particle suspension increases;

(h) means for comparing the output of said second detector means relative to the output of said first detector means for obtaining the amount of particle suspension of the fluid; and

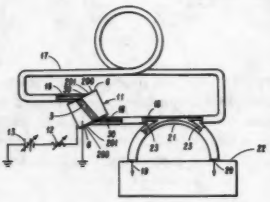
(i) means for compensating the relative output between said first and second detector means for accounting for variations in surface areas of the particle suspension in the fluid.

4,986,661

SOLID STATE FIBER OPTIC SEMICONDUCTOR RING LASER APPARATUS

Gerald L. Vick, Mt. Vernon, Iowa, assignor to Rockwell International Corporation, El Segundo, Calif.

Filed Sep. 21, 1988, Ser. No. 247,976
Int. Cl.[5] G01B 9/02
U.S. Cl. 356—350 4 Claims



1. A ring laser comprising;

a. an optical fiber, having a first fiber end and a second fiber end;

b. said first fiber end and said second fiber end each having an end angle less than Brewster's Angle;

c. an optical amplifier diode having a first diode cleavage plane and a second diode cleavage plane;

d. said diode having reflection reducing coatings disposed on its first diode cleavage plane and on its second diode cleavage plane; and

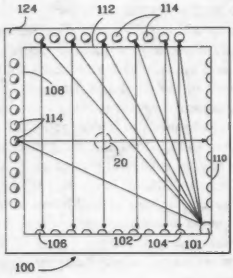
e. said optical fiber being coupled with said diode, so that, the first fiber end is optically coupled to the first diode cleavage plane and the second fiber end is optically coupled to the second diode cleavage plane.

4,986,662

TOUCH ENTRY USING DISCRETE REFLECTORS

Milan Bures, Tobaccoville, N.C., assignor to AMP Incorporated, Harrisburg, Pa.

Filed Dec. 19, 1988, Ser. No. 286,560
Int. Cl.[5] G01B 11/03
U.S. Cl. 356—375 4 Claims



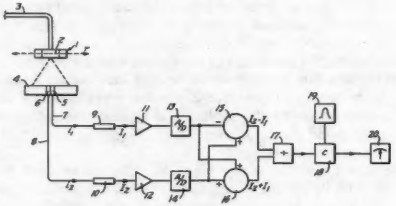
1. In a system for locating the coordinates of an object such as a stylus or the like within an area, a frame surrounding and defining said area, said frame including pairs of sides spaced apart with each side of a pair parallel to the other side of said pair to form X and Y sides of said frame, an array of individual reflectors extending in a line along the edge of said area and attached to one side of each said pair of said sides with each said reflector having a reflecting surface oriented to direct light striking said surface in a beam perpendicular to the side of the said frame to which said reflector is attached, a source of coherent light including lens means positioned on a side of said frame opposite to said reflectors and adapted to broadcast light simultaneously to each said reflector on said side opposite from said source of light, an array of light detectors extending in a line along the frame side adjacent to said source of light, means operable to cause said detectors to be sequentially enabled to effect a scan of said area beginning with a said detector closest to the said source of light and extending away from said source of light, and further means operable to stop said scan upon the detection of a shadow as an indication of the location of an object within said area for each said X and Y side of said frame.

4,986,663

METHOD AND APPARATUS FOR DETERMINING THE POSITION OF A MOBILE BODY

Stefano Cecchi, Prato, and Francesco Simonelli, Florence, both of Italy, assignors to Societa' Cavi Pirelli S.p.A., Milan, Italy

Filed Dec. 20, 1989, Ser. No. 453,663
Claims priority, application Italy, Dec. 21, 1988, 23039 A/88
Int. Cl.[5] G01B 11/00
U.S. Cl. 356—375 14 Claims



1. A method for determining the position of a mobile body movable along a rectilinear path and transversely with respect to a fixed reference body comprising the following steps:

providing one said body with a source of optical radiation having an intensity which varies in a continuous way in the direction of movement of the mobile body;

providing the other said body with at least two optical receivers aligned side-by-side in the direction of movement of the mobile body;

aiming the optical receivers directly at the source of optical radiation without any interposed encoding device, and with the optical receiver disposed so that they are completely illuminated by the radiation from said source;

converting the intensity of the optical radiation detected by each optical receiver into first electrical signal and a second electrical signal of corresponding intensity;

determining the ratio between at least said first electrical signal and at least said second electrical signal;

comparing the value of said ratio with predetermined ratio reference values corresponding to the position of the mobile body.

4,986,664

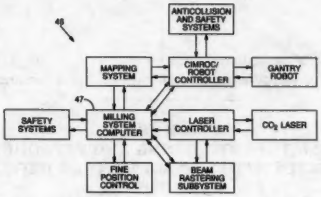
SYSTEM AND PROCESS FOR CONTROLLED REMOVAL OF MATERIAL TO PRODUCE A DESIRED SURFACE CONTOUR

Paul A. Lovoi, Saratoga, Calif., assignor to International Technical Associates, Santa Clara, Calif.

Continuation-in-part of Ser. No. 862,285, May 12, 1986, Pat. No. 4,737,628, which is a continuation-in-part of Ser. No. 577,760, Feb. 7, 1984, Pat. No. 4,588,885. This application Apr. 11, 1988, Ser. No. 180,208

Int. Cl.[5] G01B *11/24;* B23K *26/00*

U.S. Cl. 356—376 17 Claims



1. A method for selective and controlled removal of ablatable material from a surface on a substrate in order to achieve a desired surface contour, comprising the steps of:

(a) premapping a given area of the substrate and generating a premap electronic signal representative of the three dimensional topography of the given area,

(b) electronically generating and storing a reference signal representative of a desired topography of said given area,

(c) applying a coating of an ablatable material on the given area to a height sufficient to permit a milling off of excess coating until the desired surface topography is reached,

(d) while scanning said given area, generating a coated surface electronic signal representative of the three dimensional topography of the coated surface for each of a series of scan locations in the given scan area,

(e) electronically comparing the coated surface electronic signal with the stored reference signal and, upon a comparison indicating the surface height of the coating is above the desired finished surface height for a given scan location as represented by the reference signal, impinging a high intensity beam of radiant energy on the coating at that scan location for a given period of time to achieve a milling of the surface; and

(f) after said given period of time, comparing another coated surface electronic signal representing the topography of the newly milled surface and again impinging the beam of radiant energy on the given scan location for the given period of time only upon a comparison indicating the surface height of the coating is above the desired surface height for that location, and

(g) repeating step f in repeated scans of the given area, until the electronic comparison indicates the mapped surface substantially matches the desired surface characteristics as represented by the stored reference signal.

4,986,665

OPTICAL DENSITY DETECTOR

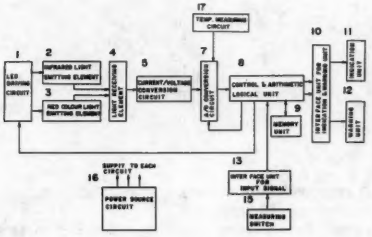
Akio Yamanishi; Hitoshi Kamezawa; Takao Sakai; Sadafusa Tsuji, and Mitsunobu Ota, all of Osaka, Japan, assignors to Minolta Camera Kabushiki Kaisha, Osaka, Japan

Filed Aug. 3, 1988, Ser. No. 227,999

Claims priority, application Japan, Aug. 6, 1987, 62-197397; Aug. 19, 1987, 62-206688; Aug. 20, 1987, 62-206791; Aug. 20, 1987, 62-206792; Aug. 20, 1987, 62-206793; Aug. 20, 1987, 62-206795; Aug. 20, 1987, 62-206797; Aug. 20, 1987, 62-206798; May 13, 1988, 63-117197; May 13, 1988, 63-117198

Int. Cl.[5] G01N *21/27*

U.S. Cl. 356—402 26 Claims



1. An optical density detector comprising:

a first light source for emitting a first light which belongs to a wavelength region in which said first light is hardly absorbed by a specific material contained in a sample;

a second light source for emitting a second light which belongs to a wavelength region in which said second light is absorbed, substantially as compared with said first light, by said specific material, wherein a peak-wavelength of said second light is shifted by change of a temperature and change of an absorption coefficient of said specific material is characteristic of a linear equation with a gentle grade;

light receiving means for measuring a quantity of said first and second lights which are, respectively, transmitted through said sample;

arithmetic means for calculating a difference of absorbence between said first light and said second light of which both change depending on the density of said specific material, on the basis of measured values measured by said light receiving means;

temperature measuring means for measuring the temperature of said first and said second light sources and said light receiving means, or measuring the ambient temperature around said first and said second light sources and said light receiving means; and

compensation means for compensating said difference of absorbence which is calculated by said arithmetic means, with an absorption coefficient of said specific material at a shifted peak-wavelength of said second light, wherein said shifted peak-wavelength is calculated on the basis of a measured value measured by said temperature measuring means.

4,986,666

SEMICONDUCTOR MEMORY DEVICE

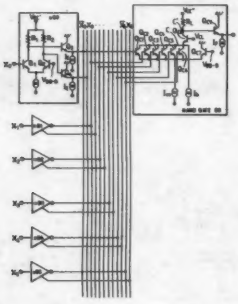
Noriyuki Homma, Kodaira; Hisayuki Higuchi, Kokubunji; Yoji Idei, Asaka; Hiroaki Nambu, Hachiouji, and Yoshiaki Sakurai, Kokubunji, all of Japan, assignors to Hitachi Device Engineering Co., Ltd. and Hitachi Ltd., both of Tokyo, Japan

Filed Nov. 29, 1988, Ser. No. 277,261

Claims priority, application Japan, Dec. 2, 1987, 62-304998; Mar. 16, 1988, 63-60377

Int. Cl.[5] G11C 7/00; H01L 29/70

U.S. Cl. 365—230.08 15 Claims



1. A semiconductor memory device comprising:

(1) a memory cell array;

(2) means for accessing a memory cell in said memory cell array; and

(3) means for reading out data from the accessed memory cell, said means for reading out the data includes means for holding a signal of the data read out, the holding means including.

first circuits electrically coupled to respective digit lines of the memory cell array for detecting read out data,

only a corresponding one of said first circuits detecting the data signal read out from the accessed memory cell,

a second circuit electrically coupled to said first circuits such that said corresponding one of said first circuits and said second circuit act together as a single latch circuit for holding the read out data signal.

4,986,667

SELF CLEANING APPARATUS FOR PREPARING AQUEOUS AIR FOAMS

Thomas W. Berger, Roseville, Minn., assignor to Minnesota Mining and Manufacturing Company, St. Paul, Minn.

Filed Jun. 23, 1989, Ser. No. 370,687

Int. Cl.[5] B01F 5/04

U.S. Cl. 366—173 8 Claims

1. An apparatus for preparing foam materials comprising:

first piping means for connection with a source of a first liquid component of a foam material;

second piping means for connection with a source of a second liquid component of a foam material;

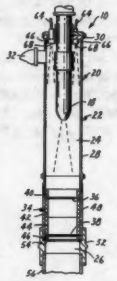
a mixing chamber connected to said first piping means and said second piping means for mixing said first liquid component and said second liquid component;

a housing having walls defining an internal compartment and an outlet opening;

partition means extending across said outlet opening and having a multiplicity of orifices;

a nozzle coupled to said chamber and said housing for spraying mixed materials from said chamber into said compartment and toward said orifices;

a passageway connected to said first piping means and including a port adjacent said walls of said housing for continuously discharging a portion of said first liquid component onto said walls;



a source of pressurized air; and

means for introducing said air into said compartment.

4,986,668

INFORMATION RECORDING AND REPRODUCING APPARATUS WITH MANAGEMENT OF DEFECTIVE SECTOR

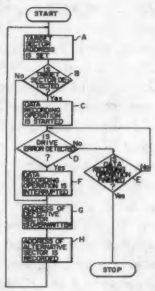
Yoshihisa Fukushima, Osaka; Isao Satoh, Neyagawa; Makoto Ichinose, Sakai; Yuzuru Kuroki, Toyonaka, and Yuuji Takagi, Neyagawa, all of Japan, assignors to Matsushita Electric Industrial Co., Ltd., Osaka, Japan

Division of Ser. No. 76,170, Jun. 22, 1987, Pat. No. 4,885,735. This application Oct. 3, 1989, Ser. No. 416,834

Claims priority, application Japan, Oct. 28, 1985, 60-241060; PCT Int'l Appl., Oct. 27, 1986, PCT/JP86/00539

Int. Cl.[5] H04N 5/76; G11B 5/09

U.S. Cl. 369—59 3 Claims



1. An information recording and reproducing apparatus for use with a disk type information recording medium having a plurality of tracks divided into a plurality of sectors and including tracks having (a) a plurality of normal sectors each having a sector mark recorded therein in a head portion and an address recorded in an address area in a sector ID field thereof and, (b) on the same track, at least one alternative sector in which an address has not been recorded in an address area in a sector ID field thereof; said apparatus comprising:

information recording means for recording data on a data field in a sector;

address deleting means for recording a delete signal on the address area of a defective sector to disable reproduction of said address area by (i) first detecting an address of a sector located precedent to said defective sector and (ii) thereafter recording said delete signal in response to a first

detected sector mark, whereby said first detected sector mark is associated with said defective sector; and

address recording means for recording the address of said defective sector on the address area of an unused alternative sector located on the same track as the defective sector;

said information recording means recording information designated for the defective sector within that alternative sector having an address area thereof recorded with the address of the defective sector.

4,986,669

ELECTRONIC CLINICAL THERMOMETER

Keiji Yamaguchi, Shimizu, Japan, assignor to Terumo Kabushiki Kaisha, Tokyo, Japan

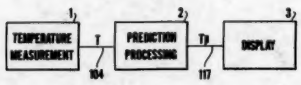
PCT No. PCT/JP87/00865, § 371 Date May 18, 1989, § 102(e) Date May 18, 1989, PCT Pub. No. WO88/04039, PCT Pub. Date Jun. 2, 1988

PCT Filed Nov. 10, 1987, Ser. No. 363,892

Claims priority, application Japan, Nov. 19, 1986, 61-274088; Nov. 19, 1986, 61-274089

Int. Cl.[5] G06F *15/42*; G01K *3/00*

U.S. Cl. 374—107 **4 Claims**



1. An electronic clinical thermometer for predicting a sensed temperature that will prevail at a future time, comprising:

temperature measurement means for sensing temperature and generating temperature data indicative of the temperature sensed;

time signal generating means for measuring elapsed time from start of temperature measurement and generating time data indicative of the measured elapsed time;

memory means for storing the sensed temperature data in a manner correlated with the time data that prevailed when the temperature data was sensed; data reading means for reading plural items of temperature data out of the memory means as measurement proceeds;

signal analyzing means having a predictive functional formula in which a state of temperature change with respect to elapsed measurement time is stipulated by a power series wherein coefficient parameters are undetermined and time is a variable, values of the coefficient parameters being set by performing regression analysis wherein read temperature data serve as purposive variables and each term of the power series of the time data serves as an explicative variable; and prediction processing means for calculating sensed

temperature that will prevail at a future time in accordance with the predictive functional formula specified by the set values of the coefficient parameters.

4,986,670

TEMPERATURE MEASUREMENT DEVICE

Futoshi Uchiyama; Ko Agatsuma; Takeshi Ohara; Koichi Tsukamoto, all of Tsukuba; Sumiyuki Ishigami, Tokyo; Mitsuru Sato, Tokyo, and Hisashi Sugimoto, Tokyo, all of Japan, assignors to Agency of Industrial Science & Technology, Ministry of International Trade & Tokyo Denpa Co., Ltd., Tokyo, Japan

Filed Nov. 17, 1989, Ser. No. 437,666

Claims priority, application Japan, Nov. 19, 1988, 63-291092

Int. Cl.[5] G01K *11/26, 7/32*

U.S. Cl. 374—117 **7 Claims**

1. A temperature measurement device for measuring temperatures in the range of normal room temperature to extremely low temperature comprising:

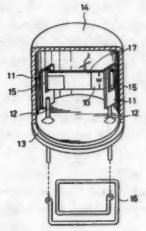
a temperature sensing element located in a region, the temperature of which is to be measured; and

a main measurement unit locate outside the region so as not to contact said temperature sensing element, in which

said temperature sensing element includes

a quartz resonator having a quartz oscillating crystal whose ratio of width to thickness is in the range of 9.48 to 9.69, and

first antenna means which is connected to said quartz oscillator for receiving radio wave signals for stimulating said quartz oscillator and for transmitting radio wave signals of reverberatory oscillation waves from said quartz oscillator, and



said main measurement unit includes

second antenna means for transmitting radio wave signals for stimulating said quartz oscillator and for receiving said radio wave signals of the reverberatory oscillation waves from said first antenna means,

means for identifying the resonant frequency of the quartz oscillating crystal based on the radio wave signals received by said second antenna means and

conversion means for converting the resonant frequency identified into a temperature in the region wherein the temperature in the region is in the range of normal room temperature to the extremely low temperature of 4° K.

4,986,671

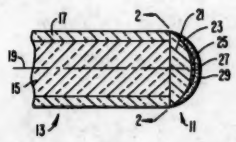
THREE-PARAMETER OPTICAL FIBER SENSOR AND SYSTEM

Mei H. Sun, Los Altos, and Kenneth A. Wickersheim, Menlo Park, both of Calif., assignors to Luxtron Corporation, Mountain View, Calif.

Filed Apr. 12, 1989, Ser. No. 336,836

Int. Cl.[5] G01K *11/20, 17/00*; G01D *5/34*; G01L *9/00*

U.S. Cl. 374—131 **44 Claims**



23. A sensor carried by an end of at least one optical fiber, said sensor comprising:

a quantity of substantially optically transparent elastomeric material having a non-planar surface extending away from said one medium end and characterized by changing its curvature in response to being compressed by force directed against it, and

a flexible layer of optical radiation reflective material attached to at least a portion of said non-planar surface in a position that is in optical communication with said medium through its said one end, whereby an optically de-

tectable shape of the reflective material changes as a force is applied to said sensor,

wherein the reflective material layer includes a solid area positioned to occupy only a portion of the field of view of said optical fiber through its said end, and wherein a quantity of material characterized by exhibiting a detectable optical change as a function of temperature is positioned as part of said sensor in another non-overlapping portion of said field of view.

43. A method of measuring at least temperature and pressure within a human body, comprising the steps of:

implanting within said body a sensor and a length of optical fiber to which the sensor is attached at one end, said sensor including:

resilient means carrying a layer of flexible optically reflecting material for controlling the degree of curvature thereof in response to external pressure, thereby to cause a degree of optical coupling between the reflecting layer and said fiber to be dependent upon the amount of such pressure, and

a quantity of luminescent material positioned in optical communication with said medium, said luminescent material being characterized by emitting, when excited by optical radiation in a first wavelength range, optical radiation in a second wavelength range that has a detectable characteristic that is dependent upon temperature of the material, said first and second optical wavelength ranges being substantially non-overlapping,

directing along the optical from outside of the body optical radiation within a third wavelength range that is substantially non-overlapping with said first and second wavelength ranges, wherein at least a portion of said third wavelength range radiation is reflected back along the optical fiber from the reflecting material layer of the sensor,

directing along the optical fiber from outside of the body optical radiation within said first wavelength range, wherein optical radiation in the second wavelength range is emitted back along the optical fiber, and

detecting the optical radiation within the second and third wavelength ranges, thereby to determine quantities that are proportional to the temperature and pressure, respectively, within the body at the location of the sensor.

4,986,672

RADIATION THERMOMETER

Thomas G. R. Beynon, Sheffield, United Kingdom, assignor to Land Infrared Limited, Sheffield, United Kingdom

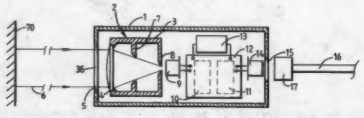
PCT No. PCT/GB88/00208, § 371 Date Sep. 7, 1989, § 102(e) Date Sep. 7, 1989, PCT Pub. No. WO88/07248, PCT Pub. Date Sep. 22, 1988

PCT Filed Mar. 18, 1988, Ser. No. 399,493

Claims priority, application United Kingdom, Mar. 19, 1987, 8706507

Int. Cl.[5] G01J *5/10*

U.S. Cl. 374—131 **5 Claims**



1. A radiation thermometer for use with a radiation monitoring system, said thermometer comprising a housing within which is mounted a radiation detector system including a radiation sensor positioned to receive radiation through a window in the housing, said sensor including electrical signal generating means for generating an electrical signal related to the temperature represented by the sensed radiation, an internal temperature detector for generating an electrical signal related to the temperature of the thermometer, an optical signal generator responsive to the electrical signals from the radiation sensor and the internal temperature detector, wherein the optical signal generator generates an alternating optical signal whose frequency is related to the electrical signal from the radiation sensor and whose mark-space ratio si related to the signal from the internal temperature detector, and wherein the housing has a portion, transparent to the optical signal, which is connectable in use with an optical waveguide for receiving and transmitting the optical signal to a monitoring system for determining the temperature of the sensed radiation from the optical signal received, and a power source connected to the detector system to constitute the sole source of power for the detector system.

4,986,673

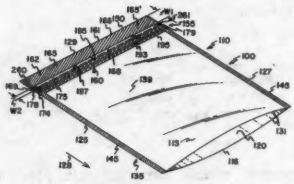
RESEALABLE BAG ARRANGEMENT AND METHOD

Gary M. Bell, Crystal, Minn., assignor to Kapak Corporation, St. Louis Park, Minn.

Filed Dec. 28, 1989, Ser. No. 458,145

Int. Cl.[5] B65D *33/02, 33/25*

U.S. Cl. 383—61 **21 Claims**



1. A resealable bag arrangement comprising:

(a) a panel arrangement including first and second opposed panel portions, each of said panel portions including a first end region and having an outer periphery;

(b) securing means securing said first and second panel portions to one another along said outer peripheries to a sufficient extent to form an internal pouch region; said securing means defining a first closed end in said panel arrangement whereat said first and second panel portions are secured to one another along said first end regions;

(c) a tab arrangement comprising:

(i) a reinforced tab portion extending along said panel arrangement first end region; and, including said first closed end and having a tab region extending thereacross; said first and second panel portions being secured to one another within said tab region; said tab region having a first average width of extension from said first closed end; said reinforced tab portion being reinforced by said first and second panel portions being secured to one another therein and said reinforced tab portion being characterized by the absence of reinforcing structure other than said first and second panel portions thereat;

(ii) a tear region having a gap portion and first and second opposite side edge portions: said gap portion extending along and adjacent said tab region; said gap portion being bordered along opposite sides by said first and second side edge portions; said first and second panel portions being secured to one another within said first and second side edge portions; said first and second panel portions not being secured to one another in said gap portion; and, said gap portion having a second average width of extension from said tab region, said gap region second average width of extension being smaller than said tab region first average width of extension; and,

(d) closure means extending across said panel arrangement immediately adjacent to said gap portion and positioned on an opposite side thereof from said tab region; said

closure means including means for selecting opening and closing of an interior portion of said internal pouch region.

4,986,674

VEHICLE ACCESSORY GLIDE APPARATUS

John H. Decker, Livonia, and Eugene M. Hatajian, Mt. Clemens, both of Mich., assignors to Irvin Automotive Products, Inc., Auburn Hills, Mich.

Continuation-in-part of Ser. No. 461,327, Jan. 5, 1990, abandoned. This application Mar. 27, 1990, Ser. No. 499,663
Int. Cl.[5] F16C *29/02*
U.S. Cl. 384—10 37 Claims

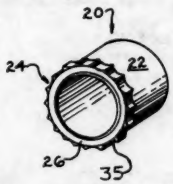
1. A glide apparatus for an assembly having a first member disposed for slidable relative movement with respect to a second member, the first member having a longitudinally-extending, generally channel-shaped portion defined by a base and spaced-apart legs protruding laterally outwardly therefrom, said glide apparatus including a number of first arcuate slide portions at least partially fixed relative to the second member and curving laterally outwardly therefrom for relative slidable engagement with at least one of the legs on the first member, and a number of second arcuate slide portions having a restrained end restrained at least from laterally inward movement toward the second member and fixed relative to the second member, said second arcuate slide portions curving laterally outwardly therefrom to a free end laterally unrestrained relative to the second member for deflectable relative slidable engagement with the base on the first member.

4,986,675

SELF-ALIGNING BEARING

Clifford L. Dye, Eaton Rapids; Leon D. Greenwood, Okemos; Mark T. Traxler, Lansing, and Lawrence J. Noren, III, Springport, all of Mich., assignors to Eaton Indiana, Inc., Nappanee, Ind.

Filed Jun. 12, 1989, Ser. No. 364,161
Int. Cl.[5] F16C *25/04*
U.S. Cl. 384—192 15 Claims



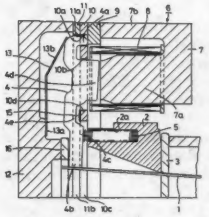
1. In combination, a socket member having an axial length, an axis and an inner cylindrical surface, a bearing member having an axial length axis, an axial bore and an outer cylindrical surface, means defining cutting teeth defined on said cylindrical surface of one of said members, the diameters of said members being such that an interference occurs between said bearing member and said socket member at said cutting teeth upon said bearing member being axially inserted into said socket member whereby said cutting teeth imbed into said cylindrical surface of the other member, said cutting teeth defined on said bearing member or said socket member extending up to the length thereof and said socket member or bearing member engagement with said cutting teeth having an axial length not substantially more than 50% of the diameter of said bearing member and said bearing member being radially unrestrained at axial locations remote from the engagement of said cutting teeth with said other member, whereby said bearing member is capable of limited tilting at the engagement of said cutting teeth to permit said bearing member axis to self-align with a shaft within said bore.

4,986,676

PRINTING HEAD OF THE IMPACT TYPE

Koichi Kimura; Takeshi Matsumoto, and Fumio Otsuka, all of Tokyo, Japan, assignors to Seikosha Co., Ltd., Tokyo, Japan

Filed Jul. 31, 1989, Ser. No. 387,674
Claims priority, application Japan, Jul. 29, 1988, 63-189864
Int. Cl.[5] B41J *2/235, 2/25*
U.S. Cl. 400—124 6 Claims



1. A printing head comprising:

a plurality of printing levers, each of said printing levers having a front end portion, a yoke portion and a rear end portion, said printing levers being rotatable about said rear end portions, said front end portions being operable to drive printing elements;

electromagnetic drive means including a plurality of core elements and plurality of coils operable to individually drive said printing levers in a driving direction so as to apply a printing force to said printing elements, said yoke portions each being juxtaposed to a core element;

resilient means applying a return force to each of said printing levers in a return direction opposite to said driving direction;

a yoke plate having first grooves in which said rear end portion of each of said printing levers are disposed and second grooves for receiving said yoke portions of said printing levers; and

means for preventing contact between each of said yoke portions of said printing levers and said core elements;

said contact preventing means being located so as to contact said printing levers at a point remote from said yoke portions and said core elements and avoid the presence of any structure between said core elements and the yoke portions;

said contact preventing means being a stopper fixed to said yoke plate.

4,986,677

ELECTRONIC TYPEWRITER HAVING IMPROVED PAPER AND INK FEED MECHANISMS SELECTIVELY DRIVEN BY A SINGLE REVERSIBLE MOTOR

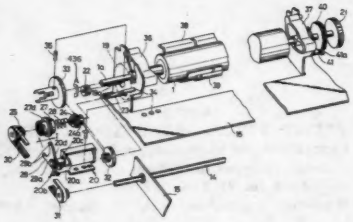
Hirootsu Kondo, Zushi; Junichi Yoshikawa, Tokyo, and Tetsuya Kawanabe, Yokohama, all of Japan, assignors to Canon Kabushiki Kaisha, Tokyo, Japan

Continuation of Ser. No. 854,194, Apr. 21, 1986, abandoned. This application Mar. 16, 1990, Ser. No. 494,839

Claims priority, application Japan, Apr. 22, 1985, 60-86661; Apr. 22, 1985, 60-86662; Apr. 22, 1985, 60-86663; Apr. 22, 1985, 60-86664; Apr. 22, 1985, 60-86665; Apr. 22, 1985, 60-86666; Apr. 22, 1985, 60-86667; Apr. 22, 1985, 60-86668

Int. Cl.[5] B41J *23/34*

U.S. Cl. 400—187 43 Claims



1. An output apparatus for outputting information to a recording medium by means of an ink sheet, said apparatus comprising:

output means for outputting information to the recording medium through the ink sheet;

a first feed mechanism for feeding said recording medium;

a second feed mechanism for feeding the ink sheet;

a third feed mechanism for feeding an ink correction sheet;

a motor for generating a driving force;

first transfer means for transferring the driving force generated by said motor selectively to (a) said first feed mechanism and (b) to one said second feed mechanism and said third feed; and

second transfer means for switching the driving force generated by said motor between said second feed mechanism and said third feed mechanism in response to a change in the direction of rotation of said motor.

4,986,678

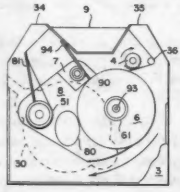
REFILLABLE INK RIBBON CARTRIDGE FOR USE IN AN ELECTRONIC TYPEWRITER

Chiman Hwang, 28606 Pacific Hwy So. 65, Federal Way, Wash. 98003

Filed Dec. 5, 1989, Ser. No. 446,418

Int. Cl.[5] B41J *35/28*

U.S. Cl. 400—208 19 Claims



1. A refillable ink ribbon cartridge for use in an electronic typewriter and a printer which comprises:

a case housing including a casing base having a banana-shaped opening, a front casing cover, a casing cover opening, a top cover, a feed spool side wall, a winding spool side wall, and a bottom plate, said front casing cover having casing cover opening disposed in the vicinity of said feed spool side wall,

a plurality of spring fixing members disposed in said case housing,

a changeable feed spool engaged within said case housing, said changeable feed spool having a hub and provided with a C-shaped first feed spool spring and a C-shaped second feed spool spring pivotably disposed in said case housing about said spring fixing members, respectively, for being symmetrically located adjacent to each other and for holding the hub of the feed spool in the space between said first and second feed spool springs,

an ink ribbon,

a replaceable winding spool engaged within said case housing in the vicinity of said changeable feed spool for winding said ink ribbon received from said feed spool, said replaceable winding spool provided with a spring arm of a pivotal connecting spring for connecting to a hub of the winding spool,

a fixed pin supported on said casing base,

a movable plate having an elliptic opening and a circular hole disposed thereon, said movable plate pivotably moving about said fixed pin and front casing cover through the pivotal connecting spring engaged with said fixed pin by a pivotal spring ring for taking out the winding spool of the casing housing when the movable plate moves from the origin position,

means for transferring the ink ribbon from said feed spool to said winding spool, and

a drive roller having a jagged wheel disposed within said housing means and in the vicinity of said winding spool for maintaining tension on the ink ribbon on the winding spool, whereby the feed spool can be inserted into and removed from the ribbon cartridge through the casing cover opening and the winding spool can be replaced after removal of the used ink ribbon wound about the winding spool by moving the movable plate from the origin position so that the used cartridge can be reused and maintains a certain tension on the ink ribbon between the feed spool and winding spool.

4,986,679

MECHANISM FOR DETECTING PRESENCE OF RIBBON STOPPER IN A RIBBON CASSETTE USED IN A PRINTER

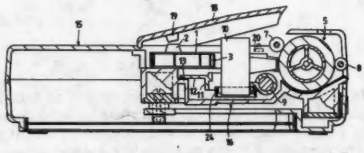
Masafumi Kawaura, Nagoya, Japan, assignor to Brother Kogyo Kabushiki Kaisha, Aichi, Japan

Filed Feb. 1, 1990, Ser. No. 473,459

Claims priority, application Japan, Feb. 8, 1989, 1-13661[U]

Int. Cl.[5] B41J *32/02*

U.S. Cl. 400—208 19 Claims



1. A printer for carrying out printing on a sheet of paper with a print element through an ink ribbon interposed between the print element and the sheet of paper, the ink ribbon being retained in a ribbon cassette in which a ribbon stopper is removably provided for limiting movement of the ink ribbon within the ribbon cassette, the ribbon cassette being detachably mounted on a printer body, the printer comprising:

a frame in which the printer body is housed;

an ink ribbon feed mechanism for withdrawing the ink ribbon from the ribbon cassette;

detecting means for detecting the presence of the ribbon stopper in the ribbon cassette when the ribbon cassette is mounted on the printer body, said detecting means outputting a first signal when the ribbon stopper is detected; and

control means responsive to the first signal outputted from said detecting means for controlling said ink ribbon feed mechanism to inhibit the ink ribbon from being withdrawn from the ribbon cassette.

4,986,680

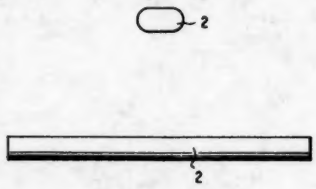
GLUE STICK AND APPLICATOR

Peter S. Melendy, R.F.D. #1, 3 Flanders Dr., Brentwood, Exeter, N.H. 03833

Filed Jan. 26, 1989, Ser. No. 301,709

Int. Cl.[5] B65H *20/00*

U.S. Cl. 401—1 **20 Claims**



1. In an elongate glue stick of the type which comprises an adhesive material which melts at a temperature substantially above room temperature and is adapted to be received in a heating chamber of an applicator, the improvement wherein the transverse cross section of said glue stick comprises a height and a width wherein said height is less than about 0.6 times said width for substantially increasing the conduction of heat to the center of said stick.

4,986,681

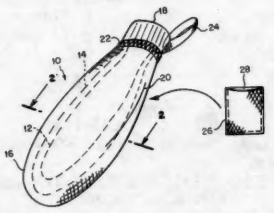
WATERPROOF DISHWASHING MITTEN

Willie R. Oliver, 164 S. Portland Ave., Brooklyn, N.Y. 11217

Filed Oct. 16, 1989, Ser. No. 421,663

Int. Cl.[5] A46B *5/04;* A47K *7/03*

U.S. Cl. 401—7 **8 Claims**



1. A waterproof dishwashing mitten comprising:

(a) an inner pocket of flexible fabric material for receiving a hand of a person;

(b) a middle liner of flexible, non-absorbent, non-porous material covering said inner pocket for protecting said inner pocket from moisture and keeping the hand of the person dry;

(c) an outer pocket of flexible absorbent material having an open end for receiving said middle liner and said inner pocket, said outer pocket further having an elongated slot at one side thereof;

(d) an elastic band sewn on said outer pocket and through said middle liner and said inner pocket at the open end thereof to provide a wrist-hugging and elastically enlargeable entrance to said inner pocket;

(e) a loop cloth strip stitched into the seam of said elastic band so that said mitten can be hung up when not being used;

(f) a mesh net bag having an opening for insertion of soap therein and being of a size to be placed through said elongated slot in said outer pocket; and

(g) means for opening and closing said elongated slot to release and retain said mesh net bag.

4,986,682

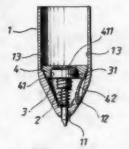
RETRACTABLE FINGER PEN

Shuenn-Chin Lu, 315 Min Tsu Rd., Tourfenn, Miaoli Hsien, Taiwan

Filed Dec. 19, 1989, Ser. No. 452,498

Int. Cl.[5] B43K *7/12, 24/02*

U.S. Cl. 401—7 **2 Claims**



1. A finger-tip receiving pen comprising:

a hollow penholder having an open read end, a front end tapering to a tip of the pen, a through-hole extending axially through the tip of the pen, a raised portion extending radially inwardly of the hollow penholder, and a hook-receiving hole extending through the hollow penholder at a location between the tip of the pen and said raised portion;

a writing element having a stepped body including a base and a shaft-like writing tip extending from said base, said base having a diameter larger than that of said shaft-like writing tip;

a socket disposed within said penholder and having a conical body defining a recess in one end thereof and a resilient hook member extending from said conical body to an end thereof that protrudes generally radially outward with respect to said hollow penholder, the base of said writing element disposed within the recess defined in the conical body of said socket; and

a spring extending around said shaft-like writing tip and urging said socket and said writing element toward said raised portion,

said socket slidable within said hollow penholder between a writing position at which the end said resilient hook member engages said penholder within said hook-receiving hole and said shaft-like writing tip extends through said through-hole to the exterior of said penholder against the urging force of said spring, and a retracted position at which the conical body of said socket abuts said raised portion under the urging force of said spring.

4,986,683

TUBULAR WRITING INSTRUMENT

Curt E. Whitright, 11257 Thwing Rd., Chardon, Ohio 44024

Filed Dec. 18, 1989, Ser. No. 451,600

Int. Cl.[5] B43K *7/00, 29/12*

U.S. Cl. 401—195 **16 Claims**

1. A writing instrument comprising:

a. a housing of generally transparent and substantially rigid hollow tubing wherein the upper portion of said housing is

curvilinear and the lower portion of said housing is straight;

b. a writing instrument inserted into the lower end of said housing;

c. one or more lengths of flexible colored material inserted into the upper end of said housing, said colored material giving no appreciable support to said hollow tubing.

4,986,684

MULTIANGULAR PEN

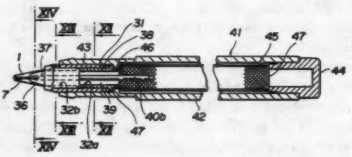
Shizuo Yamanaka, 4-16-13-301, Shimo-renjaku, Mitaka-shi, Tokyo, Japan

Division of Ser. No. 280,487, Dec. 6, 1988. This application Aug. 8, 1989, Ser. No. 390,785

Claims priority, application Japan, Dec. 7, 1987, 62-307566; Aug. 4, 1988, 63-193412; Sep. 14, 1988, 63-120957[U]

Int. Cl.[5] B43K *5/18, 3/00*

U.S. Cl. 401—224 **8 Claims**



1. A multiangular pen comprising

a pen nib having a trunk extending in the longitudinal direction of the pen nib, plural projections radially and outwardly projected from the trunk with a certain angular interval interposed between the projections, plural slits each extending downward from a tip of the trunk between the projections, plural clearances each extending along the tip portion of the projection, and an ink chamber surrounded by the slits and projections, said slits and projections being alternately arranged and the tip portion of said pen nib being formed as a pyramid;

a pen nib holder sleeve having a pen nib housing hole extending along its center axis to house the pen nib and also having a tapered portion whose diameter becomes smaller and smaller as it comes nearer and nearer a front end thereof;

a push sleeve having a guide hole extending in its longitudinal direction and communicating with the pen nib housing hole, said push sleeve being fitted into the pen nib housing hole at a back end of said pen nib holder sleeve to strike against a back end face of said pen nib;

ink introducing cores made of fibers material and extending to the ink chamber, passing through the guide hole, and the pen nib housing hole;

a penholder for housing an assembly of the pen nib, pen nib holder sleeve and push sleeve; and

an ink holding member;

wherein grooves are formed on the inner face of the pen nib housing hole in the pen nib holder sleeve to fix and hold the pen nib not to move in its rotating direction and one or more holder pieces each having a passage therein through which one of said ink introducing cores is passed is arranged integral to the front end of said pen nib holder sleeve.

4,986,685

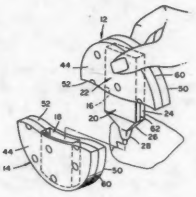
WRITING INSTRUMENT

Jerrilyn C. Kiyokane, Torrance, Calif., assignor to Namkung Promotions, Inc., Costa Mesa, Calif.

Filed Nov. 28, 1989, Ser. No. 442,777

Int. Cl.[5] A43K *7/00*

U.S. Cl. 401—213 **9 Claims**



8. A novelty writing instrument which is generally circular shaped comprising:

(a) a first, generally semicircular shaped housing portion having a radially extending cavity formed therein;

(b) a second, generally semicircular shaped housing portion mateably connected to said first housing portion, said second housing portion having a radially extending cavity formed therein, said cavities of said first and second housing portions being aligned when said first and second housing portions are connected; and

(c) writing means mounted within said first and second housing portions for writing on a writing surface, said writing means comprising a first portion mounted within said cavity of said first housing portion and a second portion slidably receivable within said cavity of said second housing portion.

4,986,686

MULTIANGULAR PEN

Shizuo Yamanaka, 4-16-13-301, Shimo-renjaku, Mitaka-shi, Tokyo, Japan

Division of Ser. No. 280,487, Dec. 6, 1988. This application Aug. 8, 1989, Ser. No. 390,863

Claims priority, application Japan, Dec. 7, 1987, 63-307566; Aug. 4, 1988, 63-193412; Sep. 14, 1988, 63-120957

Int. Cl.[5] B43K *5/18, 3/00*

U.S. Cl. 401—224 **6 Claims**

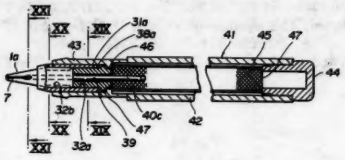
1. A multiangular pen comprising

a pen nib having a trunk extending in the longitudinal direction of the pen nib, plural projections radially and outwardly projected from the trunk with a certain angular interval interposed between the projections, a channel extending along the center axis of said trunk, plural slits each extending downward from a tip of the trunk between the projections, plural clearances each extending along the tip portion of the projection, and made continuous from said channel, said slits and projections being alter-

nately arranged and the tip portion of said pen nib being formed as a pyramid;

a pen nib holder sleeve having a pen nib housing hole extending along its center axis to house the pen nib and also having a tapered portion whose diameter becomes smaller and smaller as it comes nearer and nearer a front end thereof;

a push sleeve having a guide hole extending in its longitudinal direction and communicating with the pen nib housing hole, said push sleeve being fitted into the pen nib housing hole at a back end side of said pen nib holder sleeve to strike against a back end face of said pen nib;



an ink introducing core made of fibers material or porous resin material and extending to the ink chamber, passing through the guide hole, the pen nib housing hole and the channel in the pen nib;

a penholder for housing an assembly of the pen nib, pen nib holder sleeve and push sleeve; and

an ink holding member;

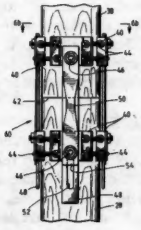
wherein a stopper section is provided on the inner face of the pen nib housing hole in said pen nib holder sleeve to fix and hold the pen nib not to move in its rotating direction and said pen nib is restricted by the tapered portion of said pen nib holder sleeve not to move in the forward direction.

4,986,687

AD-IV BREAKAWAY SYSTEM FOR TIMBER UTILITY POLES

Don L. Ivey, 4103 Carter Creek Pkwy., Bryan, Tex. 77802

Filed May 18, 1989, Ser. No. 353,868
Int. Cl.[5] F16B *7/00*
U.S. Cl. 403—2 **9 Claims**



1. A breakaway apparatus for a timber utility pole or the like comprising:

(a) a first lower tubular member adapted at a lower end to be inserted into the ground and adapted to receive the upper end of a first segment of a timber utility pole;

(b) a square lower shear base plate attached to the upper end of the lower tubular member;

(c) an upper tubular member adapted at its upper end to receive the lower end of a second segment of the timber utility pole;

(d) a square, upper shear base plate attached to the lower end of the upper tubular member;

(e) a recess in each corner of each base plate shaped to receive a connecting bolt so as to axially align the two base plates when bolts are installed in the recesses to connect the two tubular members together end-to-end;

(f) a first band adapted to be locked in place around an upper end of the second pole segment;

(g) a second band adapted to be locked in place around a lower end of a third segment of the timber utility pole;

(h) a first set of frangible connectors spaced around the timber utility pole and adapted to interconnect the two bands so as to hold the second and third pole segments in longitudinal alignment, said first set of frangible connectors having sufficient strength to enable the pole to resist lateral wind or environmental loads but being frangible upon a pre-selected minimum impact of a vehicle on the pole at ground level; and

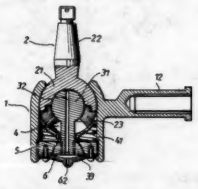
(i) a second set of frangible connectors spaced around the pole and interconnecting the two bands, said second set of flexible connectors including a slotted end permitting sufficient longitudinal freedom of movement between the two bands to enable the upper end of the second pole segment and the lower end of the third pole segment to flex relative to one another.

4,986,688

STRUCTURE OF BALL AND SOCKET JOINT FOR A VEHICLE STEERING CONTROL SYSTEM

C. T. Tuan, and Yuan-Ling Tuan, both of 4F, 64, Lane 283, Chung Cheng Rd., Yung Ho, Taipei Hsien, Taiwan

Filed Apr. 16, 1990, Ser. No. 509,509
Int. Cl.[5] F16C *11/06*
U.S. Cl. 403—127 **2 Claims**



1. A ball and socket joint, including:

a casing having a hollow, cylindrical body defining a reduced size hole at a top end, an inner thread at a lower end and a threaded shank at one side of said housing for connection to a drag link of a vehicle steering control system;

a ball socket including a semi-spherical shell having an inner thread connected to a circular head plate through a threaded joint to form a spherical member for setting in said casing with its upper spherical portion stopped at said reduced size hole, and a unitary connecting rod extending upward from the top of said shell, said connecting rod having a threaded end for securing a universal knuckle arm to the front wheel;

an end ball comprising a rod portion extending downward from a ball head, said ball head being received in said, spherical member, said rod portion having a bottom threaded end connected to an auxiliary semi-spherical ball head;

a holder plate in the form of a substantially bowl-like disc received in said casing and having a round hole in the center for the insertion therethrough of said rod portion of said end ball;

a circular seat having a spherical recess on its bottom for holding said auxiliary ball head permitting said end ball to automatically adjust its positioning, and comprising an outer thread on its circular side wall portion for threaded engagement with said inner thread of said casing and a plurality of bolt holes on its bottom surface;

a spring coil received in said casing and set between said holder plate and said seat constantly biasing said holder

plate upward into engagement with the circular head plate of said ball socket; and

a cap in the form of a circular cover having a plurality of holes corresponding to the bolt holes of said seat for the fastening therein of screw bolts to secure said cap to the bottom surface of said seat to simultaneously seal the bottom end of said casing.

4,986,689

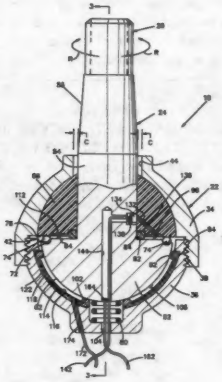
BALL JOINT

Gilbert H. Drutchas, deceased, late of Birmingham, Mich. by Elaine M. Drutchas, legal representative , assignor to TRW Inc., Lyndhurst, Ohio

Continuation of Ser. No. 141,937, Jan. 11, 1988, abandoned. This application Sep. 11, 1989, Ser. No. 405,415

Int. Cl.[5] F16C *11/08*; F16D *27/02*

U.S. Cl. 403—127 **7 Claims**



1. A ball joint comprising:

a socket and a ball stud which are rotatable and pivotable relative to each other;

said socket defining a spherical chamber and having an opening;

said ball stud having a ball portion and a stud portion extending from said ball portion, said ball portion being located in said spherical chamber and having a spherical outer surface having a center located in said spherical chamber, said stud portion projecting through said opening and having a longitudinal central axis extending through the center of said spherical outer surface, said ball stud being rotatable relative to said socket about the longitudinal central axis of said stud portion and pivotable relative to said socket about a pivotal axis extending through the center of said spherical outer surface;

a relatively hard elastomeric bearing located in said socket and circumscribing a portion of said stud portion of said ball stud, and a plurality of bearing elements disposed between said elastomeric bearing and a surface of said ball portion of said ball stud;

a material in said spherical chamber for resisting relative movement between said ball stud and said socket, said material having a viscosity which varies as a function of the magnitude of an energy field acting thereon, said spherical chamber having a first chamber portion for receiving said material, the viscosity of said material in said first chamber portion resisting rotation of said ball stud relative to said socket about the longitudinal central axis of said stud portion, and said spherical chamber having a second chamber portion separated from said first chamber portion for receiving said material, the viscosity of said material in said second chamber portion resisting pivotal movement of said ball stud relative to said socket about the pivotal axis extending through the center of said spherical outer surface; and

first and second means for applying first and second energy fields, respectively, to said material in said first chamber portion and said material in said second chamber portion, respectively.

4,986,690

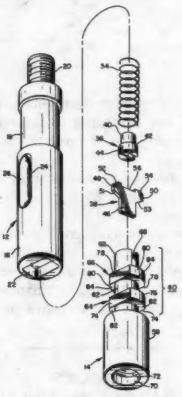
CONNECTOR ASSEMBLY FOR WIRELINE TOOL STRING

Andrew G. Cooksey, Coppell, Tex., assignor to Otis Engineering Corp., Dallas, Tex.

Continuation-in-part of Ser. No. 343,531, Apr. 26, 1989, abandoned. This application Feb. 1, 1990, Ser. No. 473,344

Int. Cl.[5] F16C *3/00*; F16D *1/10*

U.S. Cl. 403—319 **11 Claims**



1. A connector assembly suitable for use in connecting tools and stem sections in wireline tool strings, said connector assembly comprising coaxially aligned pin and box ends;

said pin end comprising axially spaced lugs adapted to be inserted into said box end and thereafter rotated into axially spaced annular channels within said box end so as to engage annular shoulders within said box end to thereby limit further relative axial movement between said pin end and said box end;

a transverse slot disposed in a forwardly extending face of said pin end;

a spring-biased locking plate disposed within said box end adapted to slidably engage said transverse slot in said pin end upon rotation of said pin end relative to said box end following full insertion of said pin end into said box end to thereby limit further relative rotational movement between said pin end and said box end, said locking plate comprising externally accessible, manually manipulatable means for selectively forcing said locking plate away from said pin end against said spring bias to disengage said locking plate from said pin end;

said box end comprising diametrically opposed, outwardly facing, axially extending flutes, an axial bore, and diametrically opposed, longitudinally extending slots communicating between said flutes and said bore;

said manually manipulatable means comprising ears that extend radially outward through said slots into said flutes but not radially beyond said flutes, so as to be manually manipulatable within said flutes in the axial direction away from said pin end to disengage said locking plate from said pin end;

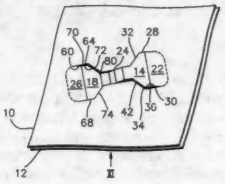
said pin end and said box end further comprising means for limiting relative rotational movement therebetween during insertion of said pin end into said box end until said pin end is inserted sufficiently into said box end that all of said axially spaced lugs are axially aligned with said axially spaced annular channels.

4,986,691

STRIP LOCKING JOINT & METHOD OF MAKING SAME

Otto P. Hafner, 1321 Paddock Way, Cherry Hill, N.J. 08034

Filed Sep. 29, 1988, Ser. No. 250,913
Int. Cl.[5] F16B 5/07
U.S. Cl. 403—375 5 Claims



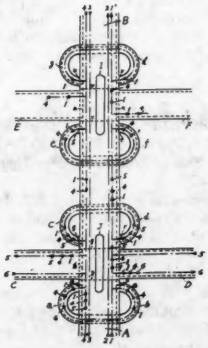
2. A releasable joint connecting together longitudinally extending deformable strips of material facing each other comprising upwardly deformed areas of said strips above their planes and downwardly deformed areas of said strips below their planes, said deformed areas having intervening tie portions arranged at angles to the planes of the sheets, said tie portions being cut out to form tongues and interlocking shoulders, said tie portions being connected to said strips between said deformed areas, whereby upon relative longitudinal movement of said sheets, said tongues are displaced to become adjacent to said shoulders and the inclined tie portions became adjacent to each other.

4,986,692

ROAD INTERSECTION CONSTRUCTION FOR TRAFFIC CONTROL

Yang Yin-Lung, P.O. Box 865, Kaohsiung, Taiwan 80099

Continuation of Ser. No. 164,811, Mar. 7, 1988, abandoned. This application Jan. 10, 1990, Ser. No. 463,860
Claims priority, application United Kingdom, Mar. 13, 1987, 8706079
Int. Cl.[5] E01C 7/00
U.S. Cl. 404—1 4 Claims



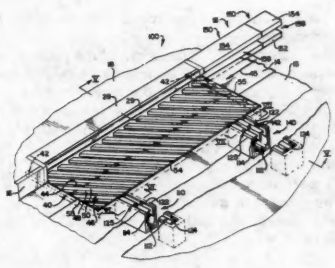
1. A road intersection comprising:
a main road having at least two traffic lanes in each direction and an inside and an outside lane in each direction having parallel center lines;
a secondary road having at least one traffic lane in each direction intersecting said main road;
a traffic is land in said intersection extending parallel to and disposed between the inside lanes of said main road blocking the lanes of said secondary road;
a pair of opposed circular detour roads disposed on either side of said intersection each detour road having an entrance opening off of the outside lane of said main road and an exit onto the outside lane thereof proceeding in the opposite direction with each outside lane having an entrance on one side of the intersection and an exit on the other.

4,986,693

ROADWAY WATER DRAINAGE INSTALLATION

David B. Salberg, Kempton Park, and Albert Rooseboom, Pretoria, both of South Africa, assignors to Salberg Concrete Products (Proprietary) Ltd., Pretoria, South Africa

Filed Nov. 6, 1989, Ser. No. 431,889
Claims priority, application Saudi Arabia, Nov. 7, 1988, 88/8328; Dec. 9, 1988, 88/9250
Int. Cl.[5] E01C 11/22
U.S. Cl. 404—4 11 Claims



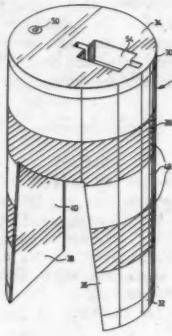
4. A roadway drainage installation, which comprises:
a roadway;
an elevated pavement extending alongside the roadway;
an apron extending alongside the roadway so that it is located between the roadway and the pavement at the level of the roadway;
a curb extending upwardly from the apron to the pavement so that the apron and curb define between them a water pathway;
a subterranean water channel running below the pavement and/or the apron and/or the roadway;
a curb inlet device comprising an opening in the apron as well as an opening in the curb, with the openings being in communication with each other and leading into the water channel so as to provide access from the water pathway to the water channel; and
a grid device located in the apron opening, with the grid device comprising an elongate support; and a plurality of elongate water deflecting members spaced apart along the support and protruding therefrom so that they extend parallel to one another as well as at an obtuse angle to the support, with each member having a planar primary water deflecting surface which extends at said obtuse angle to the support, so that the primary water deflecting surfaces hence extend parallel to one another, as well as a planar secondary water deflecting surface extending transversely to the primary water deflecting surface, so that all the secondary water deflecting surfaces lie in the same plane.

4,986,694

MARKER FOR CONCRETE BARRIERS

Peter A. Delamere, 227 Balmoral Ave., Toronto, Ontario, Canada M4V 1K1

Filed Jun. 12, 1989, Ser. No. 364,170
Claims priority, application Canada, Jul. 12, 1988, 585186
Int. Cl.[5] E01F *9/00*
U.S. Cl. 404—6 9 Claims



1. For use in marking the position of concrete safety barriers, a marker comprising:

a hollow, substantially cylindrical body portion which is bifurcated from one end to define two spaced-apart legs, an end wall closing the non-bifurcated end,

inner walls closing the bifurcated end in such a way that said inner walls define hollow leg portions with parts of the said body portion, and

reflective means affixed to the exterior of said cylindrical body portion, and located on a part of the body portion facing it the direction of on-coming traffic,

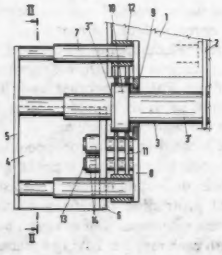
the body portion and said walls being made of deformable material.

4,986,695

LAYING PLANK FOR A ROAD FINISHING MACHINE

Dirk Heims, Bad Münder, Fed. Rep. of Germany, assignor to ABG-Werke GmbH, Fed. Rep. of Germany

Filed Aug. 4, 1989, Ser. No. 389,399
Claims priority, application Fed. Rep. of Germany, Nov. 10, 1988, 3838156
Int. Cl.[5] E01C *19/48*
U.S. Cl. 404—118 3 Claims



1. Laying plank for a road finishing machine comprising:

a centrally divided basic plank, one of the respective left-hand or right-hand half of which exhibits a central upright cheek to which an extending cylinder is attached on each side which guides an inner movable cheek of an extensible plank for the lateral prolongation of the basic plank and engages an outer movable cheek of said extensible plank for extension;

guide rods parallel to the cylinder axis being provided respectively between said inner and outer cheeks which are guided by an outer cheek connected firmly to the basic plank;

auxiliary cheeks, adjacent to the inner movable cheek, respectively connected to the extensible planks;

auxiliary guide means fastened to the inner movable cheek, parallel to the cylinder axis, and extending downwards; and

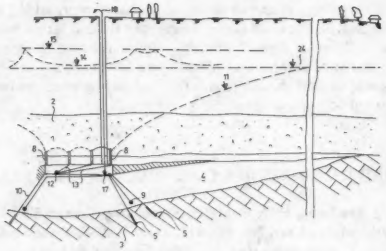
the guide rods being constructed as telescopic rods and the auxiliary cheeks being respectively guided and retained by the respective auxiliary guide means fastened to the respective inner movable cheek.

4,986,696

METHOD OF DEWATERING A SUBSTERRANEAN SPACE, ESPECIALLY A MINE

Ferenc Pera; György Szentai, both of Veszprém; Zsolt Kesserü, Budapest; Péter Tóth, Veszprém, and László Kapolyi, Budapest, all of Hungary, assignors to Veszprémi Szénbányák, Veszprém; Központi Bányászati Fejlesztesi Intezet, Budapest and Országos Foldtani Kutano és Furo Vallalat, Várpalota, all of, Hungary

Filed Nov. 22, 1988, Ser. No. 274,971
Int. Cl.[5] E21F *17/00*
U.S. Cl. 405—36 6 Claims



1. A method of dewatering a subterranean space, especially a mine, which comprises collecting water of imbibition or water artificially tapped from a water storage zone and transferring this water through a subterranean pumping station and at least one refill borehole to a refill zone without raising the water to the surface of the ground, an impermeable layer separating said subterranean space from said refill zone.

4,986,697

MARINE PIPELINE TRENCHING PLOW FOR SIMULTANEOUS PIPE LAYING AND ENTRENCHMENT

Robert P. Lynch, Tulsa, Okla., assignor to Lyntech Corporation, Tulsa, Okla.

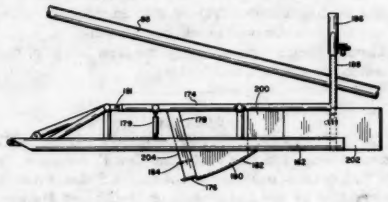
Continuation-in-part of Ser. No. 8,277, Jan. 28, 1987, abandoned, which is a continuation of Ser. No. 608,076, May 7, 1984, abandoned. This application Jan. 19, 1989, Ser. No. 299,045
Int. Cl.[5] F16L *1/04*
U.S. Cl. 405—165 15 Claims

1. A method of simultaneously digging a trench in the bottom of a body of water and laying a pipe from a barge therein which comprises the steps of:

forming a trench in said bottom by towing a trenching machine by said barge using a tow wire;

feeding and extending said pipe from said barge into said trench such that said pipe forms an unsupported catenary

curve, a locus of which extends through, but not touching, a hiatus defined by a top, bottom, and two sides relative to said trenching machine;



sensing the locus of said pipe within said hiatus by transmitting a signal to said barge in the event said pipe contacts said top or bottom of said hiatus; and

maintaining said locus substantially constant from said barge by adjusting the length of said tow wire.

4,986,698

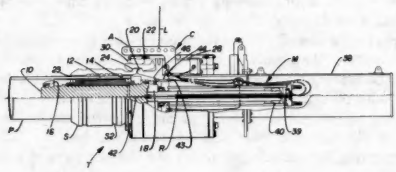
SUBSEA PIPELINE METHOD AND APPARATUS

Arthur H. T. Chin, Houston, Tex., assignor to Cooper Industries, Inc., Houston, Tex.

Filed Feb. 23, 1988, Ser. No. 159,224

Int. Cl.[5] F16L *1/26*

U.S. Cl. 405—169 **14 Claims**



1. The method of providing a connection element to the end of a damaged subsea pipeline after the removal of the damaged section including the steps of

positioning an assembly of an internal forming tool, an extending and retracting actuator connected to said forming tool substantially aligned with the end of the pipeline, and a connection sleeve element on the sea bottom in close relationship to the end of the pipeline,

extending said forming tool into the end of said pipeline,

expanding the forming portion of said forming tool into tight engagement with the interior of said pipeline,

retracting the forming tool to pull the assembly close to the end of said pipeline, to position the connection sleeve element in surrounding relationship to the pipeline and to provide a shoulder against which a forming sleeve is to abut during forming,

expanding the forming portion of said tool into forming engagement with the interior of said pipeline end to form it radially outward into gripping and sealing engagement with the interior of said connection sleeve element,

extending said actuator to move said actuator away from the end of the pipeline and from said connection sleeve element,

releasing forming pressure from said forming tool, and

thereafter retracting said actuator to remove said forming tool from within the end of said pipeline.

4,986,699

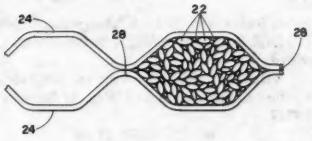
SOIL FILTRATION AND WATER DRAINAGE DEVICE

William W. Bohnhoff, 12501 E. Amherst Cir., Aurora, Colo. 90014

Filed Jun. 18, 1987, Ser. No. 63,328

Int. Cl.[5] E02B *11/00, 9/04*

U.S. Cl. 405—50 **37 Claims**



1. A transportable pillow adapted for use as a soil filtration, water storage, or water drainage device comprising:

a plurality of pellets, said pellets being lighter than water; and

a bag enclosing said pellets, said bag comprising at least in substantial part a membrane substantially permeable to water but substantially impermeable to soil, whereby water passes at a certain point through said membrane, around said pellets, and exits at another point through said membrane, said pellets contained in a loose and non-ordered state within said bag, said pillow weighing less than substantially four pounds per cubic foot.

4,986,700

BUOYANT FORCE CONTROL APPARATUS FOR SCUBA DIVING

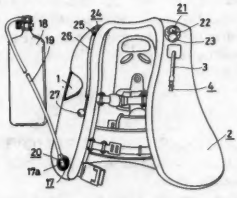
Yukio Takeda, No. 16-2-610 Akabane-Minami 1-chome, Kita-ku, Tokyo, Japan

Filed Apr. 9, 1990, Ser. No. 506,261

Claims priority, application Japan, Apr. 10, 1989, 1-90388

Int. Cl.[5] B63C *11/02*

U.S. Cl. 405—186 **3 Claims**



1. A buoyant force control apparatus for scuba diving, which comprises a wear having an inner air chamber, an air supply rubber tube, an upper opening of which tube being communicated with and secured to a half portion of the front face of said wear, an air supply valve inserted into and secured to a lower opening of said air supply rubber tube, said air supply valve having a valve shaft provided with a communication port communicated to an air breathe-in port, an air breathe-in tube passage and an air supply tube passage of said air supply rubber tube, an air supply valve situated at a position a little below the half portion of the front face of the wear, said air supply valve having an opening and closing means adapted to be opened and closed by a pushing manipulation and communicating with said air chamber and being secured there, a middle-pressure hose having an upper end connected to (an air supply tank) and a lower end connected to the air supply tube passage of said air supply valve and secured thereto, and a first and a second exhaust valves, respectively, having pull strings

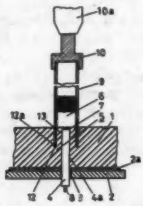
for opening and closing valves and grip balls, said first and the second exhaust valves being attached to around both shoulders of said wear so as to communicate with the air chamber and be secured there.

4,986,701

PROCESS FOR MANUFACTURING A CYLINDRICAL BODY AND A DEVICE FOR CARRYING OUT THE PROCESS

Heyno Garbe, Baden, and Dietrich Königstein, Gebenstorf, both of Switzerland, assignors to ASEA Brown Boveri Ltd., Baden, Switzerland

Filed Nov. 15, 1989, Ser. No. 436,744
Claims priority, application Fed. Rep. of Germany, Nov. 19, 1988, 3839212
Int. Cl.[5] B23B *35/00*
U.S. Cl. 408—1 R 8 Claims



1. A process for manufacturing a cylindrical body from a comparatively easily deformable material, in particular absorbents, wherein

a plane-parallel board is firstly cut out of the material,

a guide opening, is then introduced into and passed through this plane-parallel board, perpendicular to the surface,

a matching guide part is inserted into the guide opening

a tubular cutting element, guided by the guide part cuts the body out of the board, concentrically to the guide opening,

the guide part is connected without jolting to a slideway,

then the guide part is taken out of the body and at the same time the slideway is pulled into the body, and

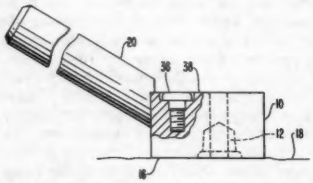
after the separation of the guide part and the slideway, the body carried by the slideway is introduced into a measurement device.

4,986,702

FASTENER COLLAR REMOVER

Kevin D. McKinney, Wichita, Kans., assignor to The Boeing Company, Seattle, Wash.

Filed Apr. 20, 1990, Ser. No. 512,183
Int. Cl.[5] B23B *49/02*
U.S. Cl. 408—54 4 Claims



1. A device for removing a collar coaxially fixed to a projecting end of a fastener axially extending through the surface of a substrate, the device comprising:

a jig having opposed base and top surfaces and a cavity open at said base surface and disposed to coaxially receive said collar when said base surface is disposed on said substrate;

at least one drill bit bushing extending through said jig on an axis generally parallel to and spaced a predetermined distance from the axis of said cavity, said bushing being disposed to guide a drill bit into engagement with said collar when disposed in said cavity; and

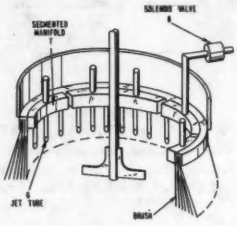
adjustable means for controlling the axial length of drill bit extending through said bushing.

4,986,703

AUXILIARY CONTROL TECHNOLOGY FOR ROUTERS

Vladimir Hampl, Pleasant Plain, and Ova E. Johnston, Franklin, both of Ohio, assignors to The United States of America as represented by the Department of Health and Human Services, Washington, D.C.

Filed May 1, 1989, Ser. No. 345,317
Int. Cl.[5] B23Q *11/02*
U.S. Cl. 409—131 18 Claims



16. A method for removing work particles from a workpiece during a routing operation, comprising

applying a plurality of air jets along a direction substantially opposite the trajectory of any particles being removed by the routing operation in order to slow said particles down wherein said plurality of air jets comprise either a plurality of parallel air jets or one or more desired air jets selectively activated from a group of air jets; and

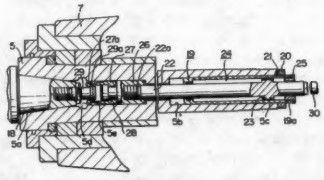
removing the particles by means of a vacuum exhaust means.

4,986,704

TOOL MOUNTING APPARATUS

Hiroshi Narushima, Konan, and Sumio Kawai, Kasugai, both of Japan, assignors to Okuma Mahinery Works Ltd., Kitaku, Japan

Filed Nov. 22, 1988, Ser. No. 275,223
Claims priority, application Japan, Nov. 24, 1987, 62-295490
Int. Cl.[5] B23C *5/26;* B23B *31/10*
U.S. Cl. 409—233 4 Claims



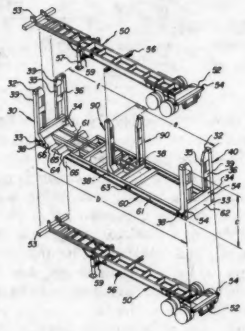
1. A mounting apparatus for fixedly mounting a removable element such as a tool or an abrasive wheel to a rotatable spindle comprising a resilient means incorporated into said spindle, said resilient means being constituted to create a resilient force by compressing a sealingly enclosed elastic fluid,

said resilient force of said resilient means fixedly mounting the removable element to the rotatable spindle.

4,986,705
STACKABLE FREIGHT CONTAINER FOR HOLDING STACKED CHASSIS

Robert O. Durkin, Arlington, Va., assignor to EIS Corporation, Washington, D.C.

Filed Nov. 25, 1987, Ser. No. 125,617
Int. Cl.[5] B60P *3/06*
U.S. Cl. 410—57 **1 Claim**



1. Freight-handling apparatus comprising in combination a body for stacking interchangeably in superimposed relationship with other bodies and chassis of the same or differing lengths, each said chassis comprising a main frame with parallel side beams and a rear bolster means secured to said side beams, wheel means mounted on one end of said main frame, landing gear legs mounted on the other end of said main frame, a chassis support beam mounted transverse to said main frame and extending past the sides of said parallel side beams of said main frame, said chassis support beam being located between said landing gear legs and said wheel means and a gooseneck beam assembly secured on one end to said main frame above the said parallel beams, a front bolster means secured to the other end of said gooseneck beam assembly, said stacking body comprising a support frame, front and rear endframes rotatably mounted to said support frame, an independent intermediate frame assembly rotatably mounted to said support frame and positioned between said front and rear endframes, said front and rear endframes and intermediate frame assembly being adapted to be raised upward to assume a substantially perpendicular position with respect to a plane defined by the support frame to hold chassis thereon and restrain said chassis from movement, said endframes when not used to hold chassis being adapted to be positioned in a horizontal position in relation to said plane of the support frame.

4,986,706
HEADER WALL

John J. Williams, Jr., 9543 Horton, Overland Park, Kans. 66212

Filed Apr. 14, 1986, Ser. No. 851,808
Int. Cl.[5] B61D *45/00*
U.S. Cl. 410—129 **3 Claims**

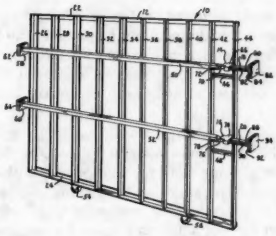
1. A portable, cargo retaining apparatus for a cargo receiving vehicle having spaced apart side walls, said apparatus comprising:

a substantially rectangular barrier having a plurality of rigid bars interconnected in a criss-crossing pattern, said barrier having a size to fit in the vehicle between the walls thereof with opposite ends of the barrier located adjacent the respective walls;

a first pair of abutment elements on one end of said barrier for engagement with the wall adjacent said one end of the barrier;

a second pair of abutment elements mounted on the other end of said barrier for in and out movement away from and toward the wall adjacent said other end;

jacking means for moving the second pair of abutment elements in and out by jacking action to permit the elements in the second pair to be jacked against the adjacent wall to



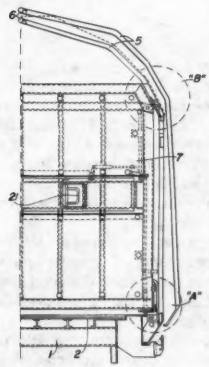
tightly retain the barrier in place in extension between the walls, and to permit the elements in the second pair to be retracted away from the adjacent wall to release the barrier; and

a plurality of wheels on said barrier permitting the barrier to be wheeled along a supporting surface, said wheels directly underlying the barrier to permit the barrier to be placed directly against a load in the vehicle with said bars in direct contact with the load.

4,986,707
RAILROAD FREIGHT CAR

Karl-Dieter Reemtsema, Minden/Westfalen; Peter Wackermann, Wunsdorf; Guenter Ahlborn, Siegen, and Gerhard Kampmann, Netphen, all of Fed. Rep. of Germany, assignors to Waggon Union GmbH, Siegen, Fed. Rep. of Germany

Filed Jul. 10, 1989, Ser. No. 378,404
Claims priority, application Fed. Rep. of Germany, Jul. 8, 1988, 3823208
Int. Cl.[5] B61D *39/00*; F16B *39/24*
U.S. Cl. 410—132 **9 Claims**



1. A railroad freight car comprising:

a substantially level freight floor;

first and second end walls positioned at ends of said freight floor;

first and second hoods located in a common plane for covering said freight floor, said hoods cooperating with said end walls to define a freight room and each of said hoods having an apex with joints for pivoting out portions of said hoods and a sealing arrangement, said hoods including mounting means for allowing said hoods to be raised for displacement into a displacing position over one another, said hoods each including rollers, connectable with rails, said rails being mounted to said freight floor for depositing said hoods on said rails;

separation walls positioned within said freight room, each of said separation walls including separation wall rollers, said freight floor including first and second separation wall rails positioned on each side of a central area of said freight room said rollers being engageable with said rails and,

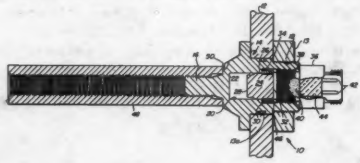
separation wall arresting means including releasable pegs engageable with holes defined by said freight floor and swivelable locking cams for engagement with one of said hoods, said separation wall arresting means including means for engaging said releasable pegs with said peg holes and for swiveling said cams for engagement with one of said hoods.

4,986,708

SELF-SEALING SEPARATION FASTENER FOR SMALL CONFINES

Martin E. Moore, and Robert R. Bennett, both of San Diego, Calif., assignors to The United States of America as represneted by the Secretary of the Navy, Washington, D.C.

Filed Jun. 12, 1989, Ser. No. 365,170
Int. Cl.[5] F16B *13/04*
U.S. Cl. 411—20 **13 Claims**



1. A separable fastener comprising:

a fastener body having a head end and a shank end, said head end defining an open-ended cavity having a closed end proximate to said shank end of said fastener body;

a punch slideably disposed within said open-ended cavity and being moveable between a first position remote from said closed end of said fastener body cavity and a second position in contact with said closed end of said fastener body cavity;

fluid pressure generating means for selectively generating at least a preselected fluid pressure upon said punch so that said punch is biased to said second position;

means for closing and sealing said open-ended cavity of said fastener body; and

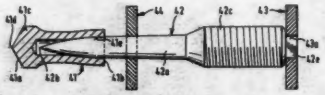
restraining means for restraining said punch at said first position until said pressure generating means generates said preselected fluid pressure; so that said restraining means releases said punch when said pressure generating means generates said preselected fluid pressure so that said punch is propelled from said first position to said second position to separate said shank end of said fastener body from said head end of said fastener body.

4,986,709

FASTENING ELEMENT ASSEMBLY

Hans Hachtel, Schaanwald, Liechtenstein; Michael Maier, Feldkirch-Tisis, and Gerhard Ehmig, Rankweil, both of Austria, assignors to Hilti Aktiengesellschaft, Liechtenstein

Filed Dec. 26, 1989, Ser. No. 456,305
Claims priority, application Fed. Rep. of Germany, Dec. 23, 1988, 3843391
Int. Cl.[5] F16B *13/04*
U.S. Cl. 411—30 **7 Claims**



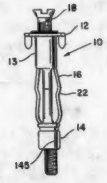
1. Fastening element assembly for use in a hard receiving material, such as concrete, masonry and the like, comprising an axially extending sleeve and an axially extending bolt, each having a leading end facing in the insertion direction into the receiving material and a trailing end facing in the opposite direction, said bolt having a pointed tip at the leading end thereof, said bolt having a shank extending from the pointed tip toward the trailing end, said shank having an axial length greater than the axial length of said sleeve, said sleeve having an inside surface, said shank having an outside surface corresponding at least partially to the inside surface of said sleeve, wherein the improvement comprises that said sleeve has engagement faces for transferring rotational motion to said sleeve where the rotational motion acts about the axis of said sleeve, said sleeve has a cutting edge at the leading end of said sleeve extending transversely of the sleeve axis, and said sleeve has an axially extending bore and said bolt is frictionally engageble within said sleeve bore so that the rotational motion transferred to said sleeve can drill a hole into the receiving material, and the pointed tip portion being longer than said sleeve such that after the sleeve is drilled into and set in the receiving material the pointed tip of said bolt can be driven axially through said sleeve bore from the leading end of said sleeve into the receiving material.

4,986,710

SCREW ANCHOR

Kerry M. Kovarik, Kutztown, Pa., assignor to Emhart Inc., Towson, Md.

Filed May 7, 1990, Ser. No. 520,046
Int. Cl.[5] F16B *13/04*
U.S. Cl. 411—38 **3 Claims**



1. A blind screw anchor comprising

a flange at one end,

a cylindrical sleeve adjacent said flange,

a cylindrical nut at the other end, and

a plurality of collapsible legs extending between said sleeve and said nut,

said nut including

a cylindrical outer layer having a longitudinally extending open seam,

an intermediate layer and

an inner layer,

said inner and outer layers having a common attached edge and said inner and intermediate layers having a common attached edge and

said inner layer tapering inwardly from the ends of said inner and outer layer common edge in the cylindrical plane of the inner layer of the nut.

4,986,711

ANCHORING PLUG

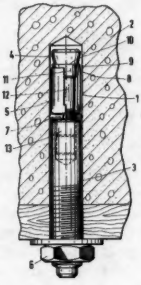
Artur Fischer, Waldachtal/Tumlingen, Fed. Rep. of Germany, assignor to fischerwerke Artur Fischer GmbH & Co. KG, Tumlingen/Waldachtal, Fed. Rep. of Germany

Filed Aug. 17, 1988, Ser. No. 233,276

Claims priority, application Fed. Rep. of Germany, Sep. 9, 1987, 3730211

Int. Cl.[5] F16B *13/06*

U.S. Cl. 411—55 **7 Claims**



1. An anchoring plug, comprising, a plug shaft having a leading end and a trailing end as considered in direction of driving into a supporting structure; mounting means provided on said trailing end of said plug shaft for mounting an object; a metallic expansible sleeve having an inner surface; and a metallic expander cone which is to be pulled into said expansible sleeve and has an outer conical surface, said expander cone being provided with an abutment; and a sliding sleeve which is located between said expander cone and said expansible sleeve and abutting against said abutment so that said expander cone is displaceable into said expansible sleeve with interposition of said sliding sleeve which is taken along, said sliding sleeve is composed of such material that said material is deformed and clogs pores of said surfaces of said expander cone and said expansible sleeve and also has sliding property to improve slidability between said expander cone and said expansible sleeve, said material of said sliding sleeve being a material selected from the group consisting of polyamide and lead.

4,986,712

FASTENER ASSEMBLY

Robb M. Fultz, Huntington, Ind., assignor to Emhart Industries, Inc., Towson, Md.

Filed Dec. 18, 1989, Ser. No. 452,541

Int. Cl.[5] F16B *37/00, 43/00*

U.S. Cl. 411—428 **4 Claims**

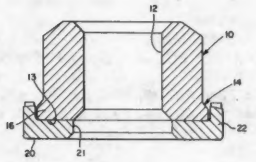
1. A fastener assembly comprising

a flanged steel nut having an internal threaded bore and a flanged base portion having a washer engaging surface,

a steel cup washer for receiving said flanged base portion, said steel cup washer having a flat bottom portion for engaging with said flanged nut washer engaging surface and having a cylindrical wall portion integral at one end with said washer bottom portion,

the top surface of said cylindrical wall portion being staked at at least a plurality of locations to capture said flanged nut within said steel cup washer,

the inner diameter of said cylindrical wall portion being selected to be slightly larger than the outer diameter of said flanged base portion and said stakes being spaced from said flanged base portion so that said base portion can be freely rotated within said steel cup washer,



means for defining a coefficient of friction between the work surface and said steel cup washer higher than the coefficient of friction between said steel cup washer and said flanged nut so that said flanged nut will rotate relative to the stationary steel cup washer during final tightening, said defining means comprising a coating of zinc on said steel cup washer and a base coating of cadmium and a surface coating of wax on said steel flanged nut.

4,986,713

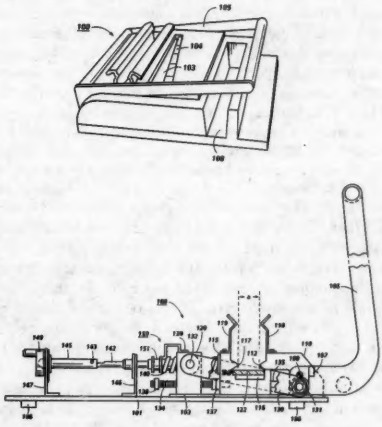
APPARATUS FOR APPLYING HARD AND SOFT COVERS TO BOUND OR UNBOUND DOCUMENTS

John D. Zoltner, Rochester; Daniel L. Carter, Penfield; Anthony F. Lipani, Pittsford, and John F. Gardner, Penfield, all of N.Y., assignors to Xerox Corporation, Stamford, Conn.

Filed Jun. 20, 1989, Ser. No. 369,571

Int. Cl.[5] B42B *5/00*

U.S. Cl. 412—34 **38 Claims**



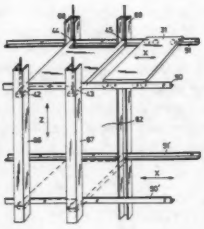
1. An apparatus for binding pages of an uncased book, comprising: a case having front and back covers, a spine portion and a U-shaped channel member attached thereto first and second jaw means; a bed onto which said case is rested; guide means for guiding said case with pages inserted therein onto said bed; and means for moving said first jaw toward said second jaw in order to crimp only outside spine areas of cases

and not a spine portion thereof and thereby secure pages to said case.

4,986,714
VEHICLE ELEVATOR AND CONVEYOR ARRANGEMENT

Göran Fernström, Norsborg, Sweden, assignor to Sky Park AB, Stockholm, Sweden

PCT No. PCT/SE89/00205, § 371 Date Dec. 5, 1989, § 102(e) Date Dec. 5, 1989, PCT Pub. No. WO89/09866, PCT Pub. Date Oct. 19, 1989
PCT Filed Apr. 13, 1989, Ser. No. 435,468
Claims priority, application Sweden, Apr. 14, 1988, 8801396
Int. Cl.[5] E04H *6/18*
U.S. Cl. 414—256 6 Claims

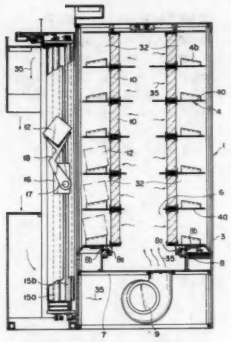


1. Vehicle elevator and conveyor arrangements for cars, in a multi-storied vehicle parking building of the kind in which a vehicle is moved to a parking space in said building, which includes a plurality of parking spaces, without the assistance of a driver and without being rolled, said conveyor arrangement including at least one transfer carriage which comprises a transport carriage, which in turn includes lifting devices constructed to raise and lower all wheels of the vehicle, said at least one transfer carriage being movable in a horizontal plane in the parking building and also in a vertical direction in said building by means of an elevator arrangement, which elevator arrangement includes an elevator platform for supporting a transfer carriage, characterised in that each of the floors or stories of the parking building on which a transfer carriage (31) is intended to be moved is provided with two mutually parallel rails (50, 51; 50', 51') which form a horizontal conveyor path (71) for said at least one transfer carriage (31), said at least one transfer carriage (31) being intended to be moved on said rails (50, 51; 50', 51=) by means of two wheel pairs (52, 53; 54, 55; 56, 57; 58, 59) located on each side of a transfer carriage which depicts a track width of said transfer carriage; in that one or more elevator shafts (61, 62) are positioned at locations along the longitudinal extension of the rails; in that the wheels (52–59) of a transfer carriage can be moved from a position (55') in which the track width of a transfer carriage (31) corresponds to the distance between the bearing surfaces of the rails (50, 51) to a position (55|) in which the track width of a transfer carriage is smaller than said distance; in that the elevator platform (40) includes a plate whose length (L) is shorter than the distance between said parallel rails (50, 51); in that lifting attachments (42–45) extend from the platform (40) in the longitudinal direction thereof; in that said parallel rails (50, 51) are interrupted in the vicinity of each elevator shaft (61, 62) such as to allow vertical passage of the lifting attachment (42–45); in that the longitudinal extension (46) of each interruption in the parallel rails (50, 51) is shorter than the distance between the axles of the wheels (52–59) of each wheel pair of a transfer carriage (31); and in that elevator-platform lifting devices (48) are mounted on said lifting attachment (42–45).

4,986,715
STOCK UNIT FOR STORING CARRIERS

Teruo Asakawa, Yamanashi, Japan, assignor to Tokyo Electron Limited, Tokyo, Japan

Continuation of Ser. No. 218,264, Jul. 13, 1988, abandoned. This application Oct. 17, 1989, Ser. No. 423,591
Int. Cl.[5] B65G *1/133*
U.S. Cl. 414—331 7 Claims



1. A stock unit for storing carriers comprising; a case-shaped unit body provided with storing racks to store carriers for carrying plate-like semiconductor wafers or liquid crystal substrates inside plural box-like compartments provided on said racks, said storing racks being piled in plural layers at a certain interval in said case-shaped unit body; carrier mounting ports on which said carriers that are to be placed in and out of certain box-like compartments in said racks are temporarily mounted; means for transporting said carriers between said box-like compartments and said mounting ports; and means for sending air in a direction parallel to the surfaces of said wafers or substrates when said carriers are placed on each of said box-like compartments, mounting ports and transporting means; wherein said air flows upwardly through the center of said storing rack and outwardly over the carriers, and said wafers are substantially horizontally disposed when the carriers are positioned within said box-like compartments and vertically disposed when the carriers are positioned on the mounting ports.

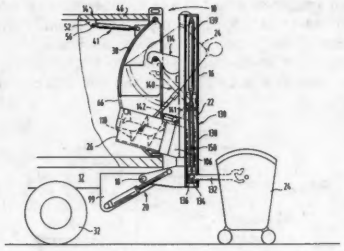
4,986,716
REFUSE COLLECTION VEHICLE

Erich Winter, Stuttgart, Fed. Rep. of Germany, assignor to Kellner AG, Steinhausen, Switzerland

Filed Oct. 16, 1989, Ser. No. 422,142
Claims priority, application Fed. Rep. of Germany, Oct. 20, 1988, 3835748
Int. Cl.[5] B60P *1/48*
U.S. Cl. 414—409 11 Claims

1. Refuse collection vehicle, the chassis of which is provided at a rear portion with a support frame for refuse collection containers, said containers being interchangeable with other containers and being equipped with integral support feet, a pressing device mounted on and integral with a lifting and tipping device for receiving refuse bins and being pivotally arranged on the rear end portion of the chassis, characterized in that a lifting and lowering device (11) is mounted on the support frame (34), said refuse collection container (14) having a one-piece rear wall (38) mounted on a fixed (at 40) upper side of the associated container opening (37), and, at the lower side of the container opening (37) being lockable in the closed position by means of a fastening device (68) which is movable to the open position by means of a swivel device (41), the rear wall (38) in its closed position being curved into the inside of

the refuse collection container (140 and is provided with a receiving opening (66) for receiving the pressing device (26) in a vertical position, the pressing device (26) and the lifting and tipping device (22) being pivotally mounted about a swivel shaft (18) on a support plate (16), by means of a plate mounted operating device (20) at said rear portion of the chassis (12) and being movable between a horizontal interchange position for the refuse collection container (14), in which position the



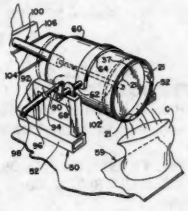
upper side of the support plate (16) adopts the height of the support surface of the support frame (34), whereby when the lifting and lowering device is actuated and the vehicle is driven forward, the container is removed from the vehicle and a vertical loading and pressing position, in which the support plate (16) is lockable with the rear wall (38) in its closed position by means of a locking device (114), and the contents of said refuse bins can be lifted and tipped into said container by said lifting and tipping device.

4,986,717

DRUM EVACUATOR APPARATUS

Samuel P. Cummins, Tinley Park, and Theodore M. Yakima, Monee, both of Ill., assignors to Algra Inc., Frankfort, Ill.

Filed Dec. 16, 1988, Ser. No. 285,127
Int. Cl.[5] B65B *69/00*
U.S. Cl. 414—417 **18 Claims**



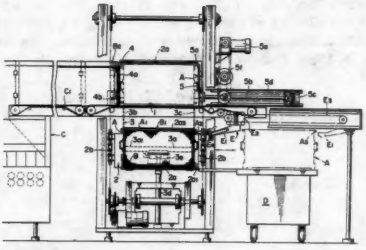
16. Apparatus comprising a generally cylindrical drum, a support securing the drum thereto, the drum having an exterior wall of a cylindrical shape and a plunger movable through the drum from one end of the drum toward the other end of the drum, the support including means movable thereon for embracing said exterior wall and for keyingly engaging said exterior wall to prevent movement of said drum relative to said support, means pivotally mounting said movable means on said support for movement of said drum between a vertical position and a horizontal position, and driving means on said support aligned with said plunger when said drum is in a horizontal position for moving said plunger in a horizontal direction through said drum.

4,986,718

METHOD AND APPARATUS FOR SUPPLYING ROD-LIKE ARTICLES

Katsuhiko Kumata; Isao Endo, both of Chiba, and Hitoshi Tachikawa, Tokyo, all of Japan, assignors to Japan Tobacco Inc. and Tokyo Automatic Machinery Works, Ltd., both of Tokyo, Japan

Filed Mar. 8, 1989, Ser. No. 320,627
Claims priority, application Japan, Mar. 18, 1988, 63-66955
Int. Cl.[5] B65G *1/08*
U.S. Cl. 414—421 **60 Claims**



1. A method for conveying rod-like articles comprising:
containing a group of said rod-like articles in a predetermined configuration in a storing box having an open top surface, inverting said storing box and moving said storing box in said inverted position in a substantially vertical direction to a supplying passage which communicates with a storing device through a shutter plate, which can be opened or closed across said supplying passage, raising a front and rear partition plate simultaneously with raising said storing box to thereby support said group of rod-like articles from said box without substantially varying said predetermined configuration, thereafter moving said front and rear partition plates in a forward supplying direction by a desired and predetermined distance to cause a front end surface of said group of rod-like articles to become substantially adjacent said shutter plate, advancing a pusher by a desired and predetermined distance to a position proximate a rear end surface of said group of rod-like articles, thereafter lowering said front and rear partition plates simultaneously with opening said shutter plate to cause said group of rod-like articles on said supplying passage to be moved in a direction substantially perpendicular to a longitudinal direction in which said group of rod-like articles extend, thereby transporting said rod-like articles into said storing device.

2. An apparatus for conveying rod-like articles comprising:
a supply passage along which said articles are transported in a predetermined direction by means of a supply conveyor;
a container distributing mechanism for holding a container for containing articles in a predetermined configuration, said configuration having a forward end and a rearward end, said configuration determined by the interior dimensions of said container, said container distributing mechanism further comprising an inverting device attached to a transporting device for moving said container between a feeding position and a discharging position adjacent a supply conveyor, said container being inverted in said discharging position; and
a containing mechanism having predetermined dimensions for containing said articles in said predetermined configuration at said discharging position and for permitting said container to be returned to said feeding position, and containing mechanism comprising a lateral feeding mechanism located adjacent said supply conveyor upstream of said rearward end of said configuration in said predetermined direction of movement of said supply conveyor for moving said articles in said predetermined direction of movement of said supply conveyor, wherein said rod-like

articles have a predetermined length and said lateral feeding mechanism comprises a lateral feeding plate for engaging said rearward end of said configuration of said rod-like articles, having a width transverse to said predetermined direction of said supply passage less than the length of one of said rod-like articles.

4,986,719

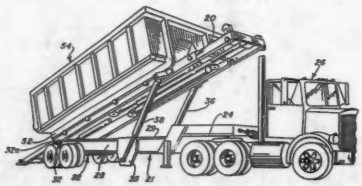
ROLL-OFF HOIST FOR VARIABLE POSITIONING OF CONTAINERS

Donald E. Galbreath, Winamac, Ind., assignor to Galbreath Incorporated, Winamac, Ind.

Division of Ser. No. 303,570, Jan. 27, 1989, Pat. No. 4,934,898, which is a division of Ser. No. 896,759, Aug. 14, 1986, Pat. No. 4,840,532, which is a continuation-in-part of Ser. No. 835,186, Mar. 3, 1986, abandoned. This application Apr. 20, 1990, Ser. No. 512,128

Int. Cl.[5] B65G *67/02*; B60P *1/28*

U.S. Cl. 414—478 **3 Claims**



1. A vehicle mounted roll-off hoist for loading, transporting and unloading containers of various sizes, each container having container stop means and cable hitch means at its forward end, said hoist comprising:

a roll-off hoist frame hingedly connected at its rearward end to a vehicle to pivot between a horizontal transport position and a rearwardly inclined loading position, said hoist frame adapted to receive a container directly atop and adjacent thereto;

a container stop carriage slidably mounted to said hoist frame forwardly of the rearward end, said carriage adapted for extension forwardly of said hoist frame and for retraction therefrom;

carriage stop means mounted on said stop carriage for engagement with coacting container stop means on a container;

a cable winch apparatus operable with said hoist frame and adapted to pull a container onto said hoist frame;

actuator means interposed between said stop carriage and said hoist frame for moving said stop carriage and a container connected thereto forwardly of said hoist frame; and

wherein said container stop carriage is mounted entirely forwardly of the rearward end of said hoist frame and is not extendable rearwardly of the rearward end of said hoist frame.

4,986,720

QUICK CONNECT/DISCONNECT WHEEL CRADLE ARRANGEMENT FOR WHEEL LIFT TOWING SYSTEMS

Gerald E. Holmes, Chattanooga, Tenn., and Fleming V. Cannon, Jr., Flintstone, Ga., assignors to Century Wrecker Corporation, Ooltewah, Tenn.

Continuation of Ser. No. 152,517, Feb. 5, 1988, abandoned. This application Jan. 24, 1990, Ser. No. 469,296

Int. Cl.[5] B60P *3/12*

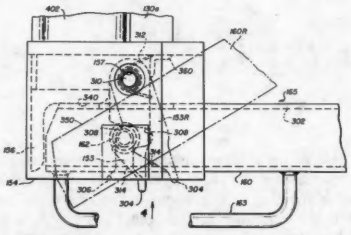
U.S. Cl. 414—563 **24 Claims**

1. In a wheel lift towing system associated with a towing system associated with a towing vehicle, towed vehicle wheel engaging apparatus comprising:

a cross arm assembly coupled to the towing vehicle and having first and second approach plates for engaging respective first portions of circumferentially extending road engaging surfaces of first and second wheels of a towed vehicle;

first and second wheel cradle members each having a side arm assembly coupled to a transversely extending wheel engaging shoe for engaging respective second portions of the circumferentially extending road engaging surfaces;

first and second sockets for direct coupling receipt of respective lateral peripheral surfaces of the first and second side arm assemblies to opposite ends of the cross arm assembly such that each wheel cradle member may be releasably coupled to its respective cross arm assembly end via a lateral sliding action substantially in a horizontal plane in a direction substantially parallel to a longitudinal axis of the cross arm assembly while the side arm assembly extends transversely to said longitudinal axis, thereby placing the side arm assembly adjacent an outer side surface of the towed vehicle with the shoe engaging the second portion of the circumferentially extending road engaging surface of the towed wheel;



wherein the first and second sockets are coupled to opposite ends of the cross arm assembly, each socket including a latching means, and wherein each side arm assembly carries a latch engaging means for coupling the side arm assembly to the socket, the latching means including means for releasing the latching means from the latch engaging means; and

wherein the latching means comprises a pivotable member coupled for rotation about a pivot pin carried by the socket and biased to a latched position by spring means.

4,986,721

EXTENDABLE BOOM FORK LIFT VEHICLE

James E. Lowder; Ronald R. Shinn, and John L. Baker, all of Lubbock, Tex., assignors to Eagle-Picher Industries, Inc., Cincinnati, Ohio

Filed Aug. 17, 1989, Ser. No. 394,889

Int. Cl.[5] B60P *1/00*

U.S. Cl. 414—685 **3 Claims**

1. A fork lift vehicle comprising;

a chassis and extendable boom mounted at one end on said chassis,

a first fork lift housing pivoted about a horizontal axis to the free end of said boom,

hydraulic tilt cylinders connected between said housing and said boom to pivot said housing,

a pair of spaced parallel small forks,

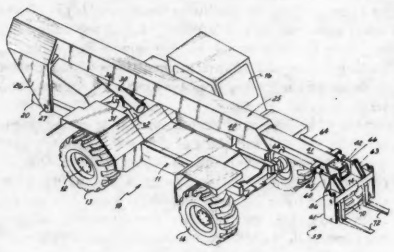
means mounting said forks on said housing for lateral movement,

an actuator for each fork to move it laterally in both directions,

a second housing and a pair of spaced parallel large forks mounted on said second housing for lateral movement,

means for attaching said first housing to said second housing,

means for connecting each of said large forks to a corresponding one of each of said small forks,



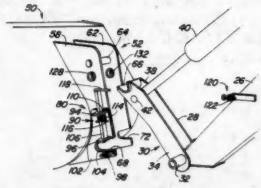
whereby the large forks are tilted by tilting the first housing and moved laterally be moving the small forks laterally.

4,986,722

MOUNTING STRUCTURE FOR A LOADER ATTACHMENT

Edward T. Kaczmarczyk, Welland, and Rory Rae, Port Colborne, both of Canada, assignors to Deere & Company, Moline, Ill.

Filed May 15, 1989, Ser. No. 352,000
Int. Cl.[5] E02F *3/28*
U.S. Cl. 414—723 **21 Claims**



18. In a loader including boom arms and an extendible and retractable boom cylinder having a first end connected to the boom arms and a second end, connecting structure for mounting an attachment to the boom arms comprising:

selectable first and second means for connecting the attachment to the boom arms and to the second end of the boom cylinder for rocking the attachment about a pivotal axis when either the first or second means is selected; and

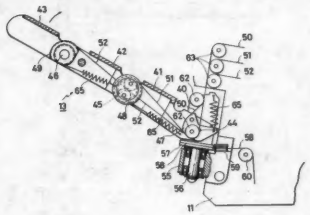
wherein the first means includes a quick attachment coupler providing substantially automatic coupling of the attachment to the boom arms and second end of the cylinder, and the second means includes a manually installed securing structure, and means for mounting the manually installed securing structure relative to the attachment and the boom arms so that the pivotal axis remains virtually unchanged relative to both the attachment and boom arms when either the first or second means is selected, wherein the invention further includes means for connecting the second end of the cylinder at the same location relative to the attachment when the second means is selected as when the first mans is selected so that the attachment position relative to the boom arms for a preselected extension of the cylinder is substantially identical when either the first or second means is selected.

4,986,723

ANTHROPOMORPHIC ROBOT ARM

Yuji Maeda, Kashiwa, Japan, assignor to Agency of Industrial Science & Technology, Ministry of International Trades Industry, Tokyo, Japan

Filed Nov. 22, 1989, Ser. No. 440,113
Claims priority, application Japan, Nov. 25, 1988, 63-297556
Int. Cl.[5] B25J *15/08*
U.S. Cl. 414—729 **8 Claims**



1. An anthropomorphic robot arm comprising a hand section, wrist section and arm section, in which said hand section comprises

a base plate,

a plurality of flexible fingers, each of which has a plurality of joints allowing it to bend at these joints and is supported by the base plate such that it is able to rotate in a direction such that the space between the flexible fingers can open and close,

one thumb which has a plurality of joints allowing it to bend at each joint and is supported by the base plate such that it is able to rotate in a direction so that it is opposable to the flexible fingers, and pulleys provided on each joint of the flexible fingers and thumb so that the joint can be bent, these pulleys each carrying a corresponding wire, a first end of which is fixed via a spring,

said wrist section is made up of a coupling which rotatably supports the base plate of the hand section, and said arm section comprises

a tube-shaped structural member which rotatably supports the coupling of the wrist section, and actuators which are built into the inside of this tube-shaped structural member and respectively connected to second ends of the wires carried on the pulleys of the joints for rotating the respective joints to cause bending motion of each finger.

4,986,724

SYSTEM FOR COMPENSATED MOTION OF COUPLED ROBOT AXES

Michael A. Steinmetz, Greenwood, S.C., and David E. Lintner, Westchester, Ohio, assignors to Cincinnati Milacron Inc., Cincinnati, Ohio

Continuation of Ser. No. 119,192, Nov. 10, 1987, abandoned. This application Feb. 3, 1989, Ser. No. 307,194
Int. Cl.[5] B25J *9/00*
U.S. Cl. 414—729 **16 Claims**

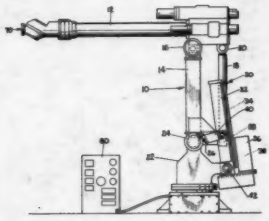
1. Apparatus for controlling a manipulator to effect motion of a tool centerpoint, the manipulator including a first rotating member, first drive means for effecting rotation of the first member, a second rotating member and a second drive means for effecting rotation of the second member, the first and second members being mechanically coupled such that absent counter action by the second drive means, rotation of the first member by the first drive means effects rotation of the second member relative to the first member, the apparatus comprising:

(a) control means commanding a location of the tool centerpoint;

(b) first measuring means responsive to actual rotation of the

first member relative to a reference for measuring rotation of the first member relative to the reference;

(c) second measuring means responsive to actual rotation of the second member relative to the first member for measuring rotation of the second member relative to the first member, the second measuring means measuring the rotation of the second member caused by the mechanical coupling of rotation of the first member;



(d) first servomechanism means responsive to the control means and the first measuring means for producing a first error signal for controlling the first drive means; and

(e) second servomechanism means responsive to the control means, the second measuring means, and the first error signal for producing a second error signal for controlling the second drive means to counteract the rotation of the second member caused by the coupled rotation of the first member.

4,986,725

APPARATUS FOR TRANSPORTING MACHINE TOOLS AND WORK TOOLS

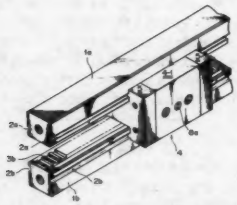
Toshiaki Geka, Kagamihara, Japan, assignor to Nippon Thompson Co., Ltd., Tokyo, Japan

Filed Dec. 29, 1989, Ser. No. 459,351

Claims priority, application Japan, Jul. 18, 1989, 1-83524[U]

Int. Cl.[5] B25J *5/02*

U.S. Cl. 414—751 **6 Claims**



1. An apparatus for transporting machine tools and work tools,

comprising a pair of track rails (**1***a*, **1***b*) and a casing (**4**) which is fitted between said track rails (**1***a*, **1***b*) so as to be slidable in an axial direction, wherein:

the track rails (**1***a*, **1***b*) are arranged in parallel so as to be away from each other in the vertical direction at upper and lower positions and track grooves (**2***a*, **2***b*) for balls (**7**) as rolling members are formed on both side surfaces of the track rails (**1***a*, **1***b*) at symmetrical positions on cross-sectional views of the track rails;

rack tooth trains (**3***a*, **3***b*) which extend in the longitudinal direction are formed on a lower surface of the upper track rail (**1***a*) and on the upper surface of the lower track rail (**1***b*);

said casing (**4**) has an almost H-shaped cross-sectional shape and comprises a casing main body (**4-1**) and two side plates (**5**) which are fixedly attached to both end surfaces in the transversal direction of the casing main body;

a lower portion of the upper track rail (**1***a*) is fitted into upper concave portion grooves (**4***c*) of the casing (**4**) and an upper portion of the lower track rail (**1***b*) is fitted into lower concave portion grooves (**4***d*) of the casing (**4**);

casing side track grooves (**4***a*, **4***b*) which face the rail side track grooves (**2***a*, **2***b*) are formed on opposite inner wall surfaces of the casing concave portion grooves (**4***c*, **4***d*), respectively;

a number of balls (**7**) are inserted among the casing side track grooves (**4***a*, **4***b*) and the rail side track grooves (**2***a*, **2***b*) which face the casing side track grooves (**4***a*, **4***b*);

a return passage (**4-2**) which extends in parallel with the casing side track grooves (**4***a*, **4***b*) is formed in the casing main body (**4-1**) and ball direction turning passages (**5***a*) are formed in the side plates (**5**) attached to both ends of the casing main body (**4-1**);

the return passage (**5***a*) and the casing side track grooves (**4***a*, **4***b*) are coupled to thereby construct an infinite circulating passage (**6**) for the balls (**7**); and

a pinion (**8**) is rotatably arranged in substantially the central position in the longitudinal and transversal directions of the casing main body (**4-1**) and the pinion (**8**) and the rack tooth trains (**3***a*, **3***b*) are come into engagement with each other so that the track rails (**1***a*, **1***b*) are movable.

4,986,726

PLANT FOR AUTOMATICALLY STACKING AND ORDERLY ARRANGING PACKS OF PANELS OF DIFFERENT SIZES

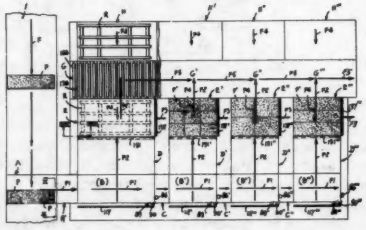
Gino Benuzzi, deceased, late of Bologna, Italy, and by Piergiorgio Benuzzi, heir, 5, Via Angelo Custode, Bologna, Italy

Continuation of Ser. No. 871,331, Jun. 6, 1986, abandoned. This application Jul. 27, 1989, Ser. No. 385,994

Claims priority, application Italy, Jun. 7, 1985, 12518 A/85

Int. Cl.[5] B65G *57/06*; B65H *35/00*

U.S. Cl. 414—789.1 **15 Claims**



12. A plant for stacking automatically on respective lifting platforms packs of panels of different sizes coming from a dividing machine and for orderly arranging said stacks adjacent to each other, to form parallelepiped assemblies for transfer to a discharge station, said plant comprising

a transport runway whereon the packs of panels coming from the dividing machine are arranged and moved side by side or in sequence;

at least one row of lifting platforms located laterally and perpendicularly to said transport runway, a top side of said platforms being below an imaginary horizontal plane in which said transport runway is located;

means operating transversely on an end portion of said transport runway, in line with the row of lifting platforms, and stopping the pack or packs of panels from the dividing machine and feeding said packs, in single file and suitably spaced apart, to transport means operating longitudinally

and above the row of lifting platforms, receiving the spaced packs of panels in single file from said transversely operating means and effecting sorting, soft stacking and orderly arrangement of said packs on the lifting platforms, so that panels of the same size are discharged onto each platform at each particular operation of the transversely operating means;

means transferring the stacks (P') of panels from said lifting platforms to adjacent stations (E) where said stacks are arranged in sequence or side by side so as to form parallelepiped assemblies of a predetermined size;

means for softly depositing each assembly of stacks, optionally onto a pallet (R), or directly onto discharging means operating at the lower portion of the same station (E) whereon said assembly is formed;

means (H-G) for feeding automatically to the stations (E) the optional pallets for the assemblies of stacks; and

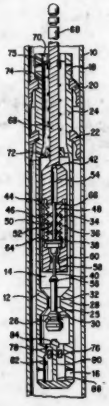
means (G) for moving the assemblies of stacks to a downstream collecting or processing station;

wherein guides (154) controlling the up-and-down movement of a carriage bar (151) are at an angle at the lower portion thereof whereby, when said carriage bar is raised after the assembly of stacks (P') has been discharged from at least one table (126), said bar will be moved away from said assembly with a horizontal component of displacement, thereby avoiding interfering with said assembly.

4,986,727
PRESSURE-OPERATED OIL AND GAS WELL SWABBING DEVICE

James R. Blanton, Carrollton, Tex., assignor to Petro-Well Supply, Inc., Dallas, Tex.

Filed Jul. 20, 1988, Ser. No. 221,891
Int. Cl.[5] F04B 47/12
U.S. Cl. 417—57 11 Claims



1. In an oil well swabbing device, the improvement comprising a pressure activated valve for use in closing a fluid passage extending through the oil swabbing device from the top to the bottom thereof when said swabbing device is submerged under liquid in a well casing corresponding to a predetermined valve closing pressure; said pressure activated valve comprising:

(a) pressure collapsible bladder means;

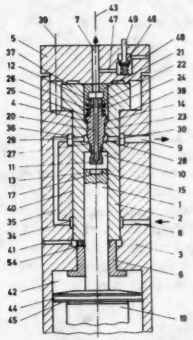
(b) a valve and seat interposed in said fluid passage; and

(c) means connecting said valve and seat means to said pressure collapsible bladder means such that said valve and seat are closed when said bladder is collapsed to a degree corresponding to said predetermined valve closing pressure.

4,986,728
FUEL INJECTION PUMP FOR INTERNAL COMBUSTION ENGINES

Peter Fuchs, Adlikon, Switzerland, assignor to Nova-Werke AG, Switzerland

PCT No. PCT/CH88/00014, § 371 Date Sep. 27, 1988, § 102(e) Date Sep. 27, 1988, PCT Pub. No. WO88/05863, PCT Pub. Date Aug. 11, 1988
PCT Filed Jan. 25, 1988, Ser. No. 269,734
Claims priority, application Switzerland, Jan. 30, 1987, 330/87
Int. Cl.[5] F02M 59/30
U.S. Cl. 417—443 17 Claims



1. A fuel injection pump for an internal combustion engine, in which the fuel injection pump includes a pump piston being guided in a sleeve (2), a valve arrangement located at an axial end of the pump piston and between a cylinder chamber and an injection line and including a valve body which cooperates with the pump piston when the pump piston is at a top dead center position and a device for establishing the piston stroke, with the distinction that the valve body (4) includes a lower end portion (11) extendable into the cylinder chamber (10) and an upper end portion (12) located adjacent the injection line (7) in a pump housing (3); a first hydraulic damping device located between a head part (13) of the pump piston (1) and the lower end portion (11) of the valve body (4); a second hydraulic damping device located adjacent the upper end portion (12) of the valve body (4) for braking movement of the valve body (4) in a direction away from the pump piston (1); and the valve body (4) being guided in a hollow chamber (14) in the sleeve (2) which connects the cylinder chamber (10) and the injection line (7); the second hydraulic damping device includes a pressure chamber (24) located around a portion of the valve body (4); a guide bore (22) extending from the pressure chamber (24) in which the upper end portion (12) of the valve body (4) is guided; an annular piston surface (25) located on the valve body (4) in the pressure chamber (24); and an annular gap (50) located between the exterior periphery of the upper end portion (12) of the valve body (4) and the inner periphery of the guide bore (22); the ratio of the cross-sectional area of the annular gap (50) to the cross-sectional area of the pump piston (1) is between 1:600 and 1:1100.

4,986,729

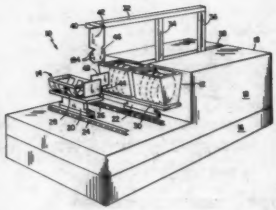
WAFER TRANSFER APPARATUS

Cord W. Ohlenbusch, Andover, Mass., assignor to Proconics International, Inc., Wilmington, Mass.

Continuation of Ser. No. 342,667, Apr. 24, 1989, abandoned, which is a continuation of Ser. No. 102,105, Sep. 29, 1987, abandoned. This application Jan. 29, 1990, Ser. No. 471,708

Int. Cl.[5] B65G *65/02*

U.S. Cl. 414—787 20 Claims



1. Apparatus for placing a first element at a precise location on a second element, there being associated with said precise location some known variation in the shape of said second element, said apparatus comprising

a support member means for supporting said first element and for translating said first element toward said second element along a placement direction,

transport means for changing the relative displacement between said support member and said second element along a transport direction transverse to said placement direction,

sensing means for sensing the relative alignment of said support member with said known variation in shape along said transport direction,

said sensing means including a scanning element that is detachably engageable by said support member, and

a holder for storing said scanning element when said scanning element is not in use, said holder being located at a position at which said support member can transfer said scanning element to and receive said scanning element from said support member.

4,986,730

STACKING APPARATUS FOR CONTINUOUSLY ARRIVING GENERALLY RECTANGULAR PRINTED PRODUCTS

Jakob Wetter, Wetzikon, Switzerland, assignor to Ferag AG, Hinwil, Switzerland

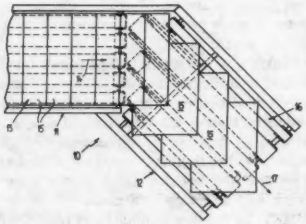
Filed Nov. 15, 1989, Ser. No. 438,328

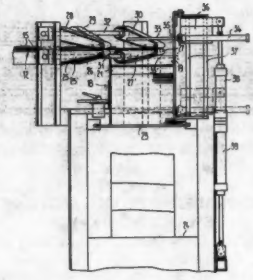
Claims priority, application Switzerland, Nov. 23, 1988, 04353/88

Int. Cl.[5] B65H *29/18*

U.S. Cl. 414—792.7 7 Claims

1. An apparatus for stacking generally rectangular printed products (15) arriving in a generally continuous series, said apparatus comprising a stack compartment (18) arranged to be charged from above and comprising at least two generally perpendicular stop rails (19, 20) defining edges of a stack, and a conveyor (10) disposed for delivering printed products to said stack compartment (18), said conveyor comprising first and second generally coplanar adjoining conveyor sections (11, 12) wherein the second conveyor section (12) directly delivers printed products to the stack compartment (18), and wherein the second conveyor section (12) has a conveying direction (17) disposed at an angle which is non-perpendicular and non-parallel to the conveying direction of the first conveyor section so that each of the printed products (15) is transferred from the first conveyor section to the second conveyor section such that a corner of the rectangular printed product becomes a leading corner while on said second conveyor, and arrives in the stack compartment (18) with said leading corner





in front, and wherein the printed products abut and form a stack against the two stop rails.

4,986,731

SHEET HANDLING APPARATUS

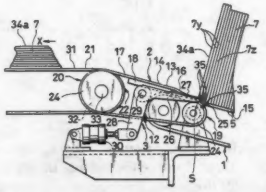
Tsutomu Shinomiya, Sapporo, Japan, assignor to Hokkai Can Co., Ltd., Tokyo, Japan

Continuation of Ser. No. 877,800, Jun. 24, 1986, abandoned. This application May 3, 1988, Ser. No. 188,767

Claims priority, application Japan, Jun. 24, 1985, 60-135972; Jun. 29, 1985, 60-98345[U]

Int. Cl.[5] B65H *3/04*

U.S. Cl. 414—798.9 18 Claims



7. An apparatus for handling a plurality of sheets of material, each said sheet having a pair of faces and a plurality of edges, said apparatus comprising:

first conveying means for receiving and conveying a stack of said sheets, said first conveying means including a substantially horizontally disposed first conveying surface which receives said sheets stacked face to face and collectively supported on edge and conveys said sheets, said first

conveying surface being driven at a predetermined speed V_1;

second conveying means, positioned adjacent to said first conveying means for tilting a substack of said stack of sheets, said second conveying means including a second conveying surface, said second conveying surface having a first portion and a second portion, said first portion being inclined at a first angle with respect to said first conveying surface, said second portion operatively connected to said first portion for receiving said substack of said stack of sheets from said first portion, said second portion being more horizontally disposed than said first portion and being inclined at a second angle relative to said first portion, said second conveying surface being driven at a predetermined speed V_2 having a vector component V; and

third conveying means positioned adjacent said second conveying means for receiving and transporting said substack of said stack of sheets in a face supported position from said second portion to a delivery location;

wherein the magnitudes of said first angle, said second angle, and speed of said first and second conveying surfaces are selected so that said substack of said stack of sheets are pivoted from a standing position on edge to a laid position on said third conveying means due to forces exerted on said substack of said stack of sheets as a consequence of said selected magnitudes of said angles and as a consequence of the difference between said speed V_1 of said first conveying surface and said component V of said speed V_2 of said second conveying surface, the direction of said component V being in parallel to said first conveying surface.

4,986,732

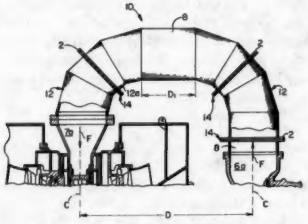
STEAM TURBINE CROSSOVER PIPING WITH REDUCED TURNING LOSSES

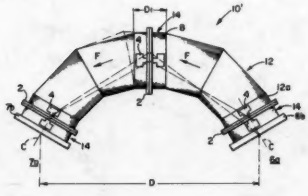
Alvin L. Stock, Casselberry, and John C. Groenendaal, Jr., Winter Springs, both of Fla., assignors to Westinghouse Electric Corp., Pittsburgh, Pa.

Filed Aug. 3, 1989, Ser. No. 389,139

Int. Cl.[5] F01D *1/24, 13/00*; F03D *13/02*; F04D *13/04*

U.S. Cl. 415—066 **18 Claims**





1. A steam turbine, comprising:

a first section adapted to receive a flow of steam for operating at a first predetermined pressure, said first section including an exhaust portion disposed at an angle of less than a substantially vertically position but greater than a substantially horizontal position;

a second section adapted to receive said flow of steam for operating at a second predetermined pressure that is relative lower than said first predetermined pressure, said second section including an inlet portion disposed at an angle of less than a substantially vertical position but greater than a substantially horizontal position; and

a piping section connecting said inlet portion to said exhaust portion, said piping section including a pair of turning subsections each of which have a radius of curvature, wherein said exhaust portion and said inlet portion each include centerline, and said centerlines of said exhaust portion and said inlet portion are separated by a predetermined distance and said radius of curvature of said turning subsections comprises a major portion of said predetermined distance.

4,986,733

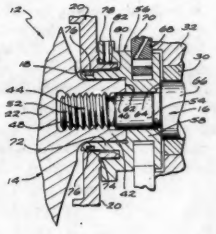
TURBOCHARGER COMPRESSOR WHEEL ASSEMBLY WITH BORELESS HUB COMPRESSOR WHEEL

Jean-Luc P. Fleury, Manhattan Beach; Jerome W. Thompson, Cypress, and Voytek Kanigowski, Garden Grove, all of Calif., assignors to Allied-Signal, Inc., Morris County, N.J.

Filed Oct. 30, 1989, Ser. No. 428,927

Int. Cl.[5] F04D *29/08*

U.S. Cl. 415—230 **18 Claims**



1. A compressor wheel assembly comprising:

a compressor backplate defining a backplate opening;

a rotatable shaft having a threaded end;

a centrifugal compressor wheel having a boreless hub supporting an array of impeller blades, and a mounting sleeve formed integrally with and extending coaxially from said hub, said mounting sleeve defining an internally threaded bore, said mounting sleeve extending into said backplate opening and having said shaft end threaded into said mounting sleeve bore, said mounting sleeve and said shaft respectively defining axially opposed first and second shoulders when said shaft end is threaded into said mounting sleeve bore;

a thrust collar spacer including a collar segment interposed axially between said first and second shoulders in abutting relation therewith when said shaft end is threaded into said mounting sleeve bore to axially position said compressor wheel relative to said shaft, said thrust collar spacer further including an annular seal flange extending axially into said backplate opening in generally concentric spaced relation between said mounting sleeve and said backplate within said backplate opening; and

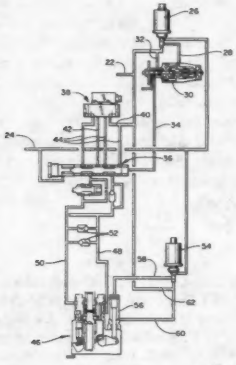
at least one seal ring carried by said seal flange in substantially sealing engagement between said seal flange and said backplate.

4,986,734

OVERSPEED PROTECTION SYSTEM FOR AIRCRAFT FAN ENGINE

John C. Layer, Caledonia, and Jeffrey D. Metcalf, Albion, both of Ill., assignors to Sundstrand Corporation, Rockford, Ill.

Filed Oct. 27, 1988, Ser. No. 263,360
Int. Cl.[5] B63H *3/00*
U.S. Cl. 416—48 9 Claims



1. An overspeed protection system for an aircraft fan engine wherein blades are rotatable from a coarse pitch to a fine pitch to a thrust-reverse condition, comprising:

a wobbler-type hydraulic motor means for rotating the blades;

overspeed governor means operatively associated with the motor means for effecting rotation of the blades in a direction toward the coarse pitch condition; and

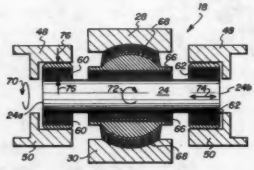
control means for moving the wobbler of the hydraulic motor means over-center to thereby change the sense of the motor means when in the thrust-reverse condition to drive the motor further into thrust-reverse on actuation of the overspeed governor means.

4,986,735

PITCH CHANGE BEARING SYSTEM

Madison K. Robinson, Bedford, Tex., assignor to Bell Helicopter Textron, Inc., Fort Worth, Tex.

Filed Oct. 13, 1989, Ser. No. 421,166
Int. Cl.[5] B64C *27/35*
U.S. Cl. 416—134 A 3 Claims



1. A pitch change bearing assembly for a helicopter having a yoke and a grip comprising:

a shaft having first and second ends;

a first radial elastomeric bearing element disposed on said first end of said shaft;

a second radial elastomeric bearing element disposed on said second end of said shaft;

a third radial elastomeric bearing element disposed on said shaft between and spaced apart from said first and second radial elastomeric bearing elements;

a spherical elastomeric bearing element disposed concentrically around said third elastomeric bearing element;

means for attaching said third radial elastomeric bearing element to a grip; and

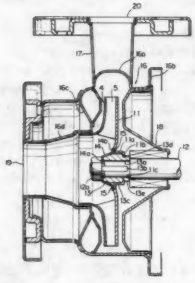
means for attaching said first and second radial elastomeric bearing elements to a yoke.

4,986,736

PUMP IMPELLER

Kenichi Kajiwara, Kanagawa; Kikuichi Mori, Chiba, and Hideo Ikeda, Kanagawa, all of Japan, assignors to Ebara Corporation, Tokyo, Japan

Filed Jan. 18, 1990, Ser. No. 466,845
Claims priority, application Japan, Jan. 19, 1989, 1-8619
Int. Cl.[5] F04D *29/38;* F01D *5/30*
U.S. Cl. 416—181 10 Claims



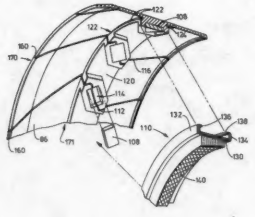
1. A pump impeller manufactured by press forming of steel plate and comprising a boss formed with a central bore for connecting said boss to a main shaft of said pump through key and key way engagement, and a main shroud fixed to said boss, said impeller characterized in that said boss is formed with a polygonal portion on the periphery of said boss, that said main shroud is formed at central portion thereof with a polygonal recess fitting to said polygonal portion of said boss, that a retainer plate is mounted on said boss at an end portion thereof opposite to an end portion from which said main shroud is fitted to said boss, and that said retainer plate is connected by welding to said main shroud.

4,986,737

DAMPED GAS TURBINE ENGINE AIRFOIL ROW

Omer D. Erdmann, Cincinnati, Ohio, assignor to General Electric Company, Cincinnati, Ohio

Filed Dec. 29, 1988, Ser. No. 291,835
Int. Cl.[5] F01D *5/22*
U.S. Cl. 416—190 22 Claims



1. A method for manufacturing a vibration damped rotating

turbine airfoil row comprising a first spool having a substantially circular cross section and being partially defined by inner and outer first spool surfaces; a second spool having a substantially circular cross section and being partially defined by inner and outer second spool surfaces; and a plurality of circumferentially spaced airfoils extending radially between said first and second spools, each of said airfoils being integrally attached at opposing ends thereof to said inner surface of said first spool and to said outer surface of said second spool, respectively, wherein said spools are coaxial and said first spool has a greater diameter than said second spool, said method for manufacturing comprising:

casting said airfoil row;

cutting said second spool between selected ones of said airfoils, thereby forming a plurality of cut lines;

attaching a damping insert to said inner surface of said second spool in association with each said cut line.

4,986,738

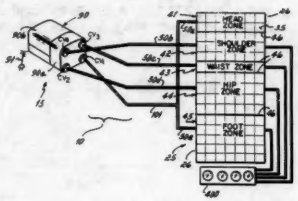
AIRFLOW CONTROL SYSTEM PUMP AND HOUSING

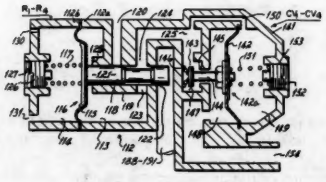
Nozomu Kawasaki, Takatsuki, Japan, and Terence A. Scott, Carthage, Mo., assignors to Leggett & Platt Incorporated, Carthage, Mo.

Filed Nov. 30, 1988, Ser. No. 278,191

Int. Cl.[5] F04B *49/08*

U.S. Cl. 417—304 **19 Claims**





1. Apparatus for supplying air to multiple zones of a body support at differing pressures, said apparatus comprising

an air pump having an inlet and an outlet,

a housing, said air pump being mounted within said housing,

an air filter mounted upon said housing,

at least three pressure regulators mounted upon said housing, each of said pressure regulators having an inlet and an outlet,

sealed pressure chambers contained internally of said housing and defined in part by walls of said housing,

passageway means contained internally of said housing walls for supplying air from outside said housing, through said filter to said inlet of said pump and from said outlet of said pump to the sealed pressure chambers and from said sealed pressure chambers to the inlets of said pressure regulators,

a plurality of normally open surge check valves mounted on said housing, and

passageway means in said housing for supplying air from the outlet of each one of said pressure regulators to one of said surge check valves and from said surge check valves to said zones of said body support.

4,986,739

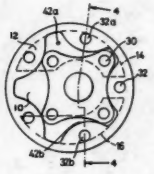
GEROTOR PUMP HAVING AXIAL FLUID TRANSFER PASSAGES THROUGH THE LOBES

Robin E. Child, Leamington Spa, United Kingdom, assignor to Concentric Pumps Limited, United Kingdom

Filed Jul. 7, 1989, Ser. No. 377,425

Int. Cl.[5] F04C *2/10*

U.S. Cl. 418—15 **10 Claims**



1. A gerotor pump comprising a casing having an internal chamber; an externally lobed rotor member rotatably accommodated within said chamber; an internally lobed annulus member rotatably accommodated within said casing, said rotor member being accommodated within and in mesh with said annulus member, said annulus member having one lobe more than said rotor member, each lobe of said rotor member contacting said annulus member at circumferentially spaced points to provide a series of circumferentially spaced working chambers; means for rotating said rotor member about an axis; a fluid inlet in said casing and in communication with said rotor member at one axial side thereof to admit fluid to each of said working chambers in response to rotation of said rotor member; a fluid outlet in said casing circumferentially spaced from said inlet, the spacing between said inlet and said outlet being such that each of said chamber is exposed in turn to said inlet and said outlet in response to rotation of said rotor member; an axial fluid transfer passage extending through each of the lobes of at least one of said members and being so located that each of said passages is exposed in succession to said inlet and outlet in response to rotation of said rotor member; and fluid transfer cavities in said casing at the opposite axial side of said rotor member from each of said fluid inlet and fluid outlet, said fluid transfer cavities enabling the passages that are exposed to said inlet and outlet in succession to be in communication with the working chambers at both axial sides of the members at the same time.

4,986,740

MECHANICAL SUPERCHARGER HAVING A THRUST BEARING

Kazunari Adachi, Toyoake City, Japan, assignor to Aisin Seiki Kabushiki Kaisha, Kariya City, Japan

Filed Aug. 31, 1989, Ser. No. 401,647

Claims priority, application Japan, Sep. 27, 1988, 63-241547; Sep. 27, 1988, 63-241548

Int. Cl.[5] F04C *29/06*

U.S. Cl. 418—83 **10 Claims**

1. A mechanical supercharger comprising:

housing means defining an enclosed volume;

two parallel rotor shafts extending through said housing means, said shafts being rotationally and axially supported in said housing means;

meshing rotors mounted on said rotor shafts such that a rotation of said rotor shafts with said rotors supercharges a gas in the enclosed volume; and

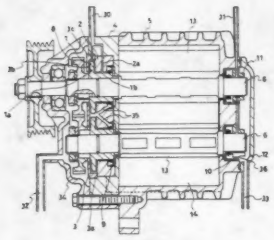
means for rotationally and axially supporting said rotor shafts in said housing means, comprising:

(a) first sliding bearing means adjacent one axial end of said rotor shafts for rotationally and axially supporting said rotor shafts,

(b) second sliding bearing means adjacent another axial end of said rotor shafts for rotationally supporting said rotor shafts, and

(c) lubricating means for supplying lubricating oil to said first and second sliding bearing means,

wherein said housing means including a bearing housing and



wherein said first sliding bearing means is in said bearing housing and comprises:

an inner part fixed to each of said shafts, each said inner part having a cylindrical part and a radially extending, disc-like plate part;

an outer part fixed to said housing means and having axial bores closely surrounding said cylindrical parts to rotationally support said cylindrical parts, wherein an axial face of said plate part closely faces said outer part; and

a retainer engaging said outer part and enclosing another axial face of said inner part, said retainer cooperating with said outer part to axially support said plate part.

4,986,741

VANE COMPRESSOR WITH BALL VALVE LOCATED AT THE END OF VANE BIASING CONDUIT

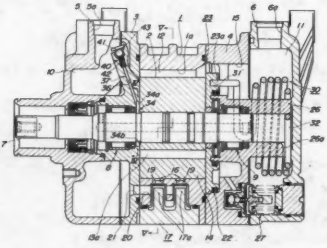
Nobuyuki Nakajima; Masaya Moruta; Toshio Yamaguchi, and Kazuo Eitai, all of Konan, Japan, assignors to Diesel Kiki Co., Ltd., Tokyo, Japan

Filed Oct. 30, 1989, Ser. No. 428,592

Claims priority, application Japan, Nov. 4, 1988, 63-144191[U]

Int. Cl.[5] F04C *29/10*

U.S. Cl. 418—268 **6 Claims**



1. In a vane compressor having a cylinder, a rotor rotatably received within said cylinder having vane slits formed therein, vanes each radially slidably fitted in an associated one of said vane slits, vane back pressure chambers each formed adjacent an associated one of said vane slits within said rotor, a discharge pressure chamber, communication passage means formed in said cylinder and extending between said discharge pressure chamber and said vane back pressure chambers, said communication passage means having a ball-receiving bore having a predetermined axial length and diameter opening at one end thereof into said discharge pressure chamber, a valve arranged in said communication passage means for opening said communication passage means when discharge pressure within said discharge pressure chamber is lower than a predetermined value, said valve having a valve body formed of a ball received within said ball-receiving bore and displaceable between a valve opening position and a valve closing position depending upon said discharge pressure, urging means urging said ball toward said valve opening position, stopper means for stopping said ball in said valve opening position,

the improvement wherein said predetermined axial length is smaller than said diameter, and part of said ball projects from said ball-receiving bore into said discharge pressure chamber when said ball is in said valve opening position.

4,986,742

PROCESS FOR THE PRODUCTION OF HIGH-GRADE TITANIUM DIOXIDE BY SULFATE METHOD

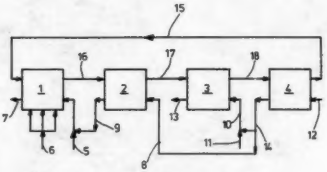
Gabriël Denecker; Werner Verhoeven, both of Kalmthout; Joel Leuridan, Antwerp, and Domien Sluyts, Stabroek, all of Belgium, assignors to Bayer Aktiengesellschaft, Leverkusen-Bayerwerk, Fed. Rep. of Germany

Continuation of Ser. No. 878,277, Jun. 25, 1986, abandoned. This application Aug. 17, 1989, Ser. No. 395,292

Claims priority, application Fed. Rep. of Germany, Jul. 5, 1985, 3524053

Int. Cl.[5] C22B *24/12*

U.S. Cl. 423—82 **15 Claims**



1. In the improved process for the production of high-grade titanium dioxide by the sulfuric acid digestion method wherein:

(a) ilmenite, or titanium-containing slag is reacted with concentrated sulfuric acid,

(b) the reaction product from (a) is dissolved in water or aqueous sulfuric acid,

(c) the insoluble raw-material fraction is separated from the solution from (b) to recover a sulfuric-acid-containing titanylsulfate black solution rich in foreign metal salts, and

(d) titanyl sulfate is hydrolyzed with subsequent separation of precipated titanium oxide hydrate followed by washing with water and drying the improvement comprises extracting titanyl sulfate from the black solution before the step (d) with an organic medium containing an organophosphorus compound of the formula

$$R_m(R^1O)_nP{=}O$$

wherein

R represents linear or branched alkyl groups,

R^1 represents alkyl groups as in R or aryl groups or alkyl substituted aryl groups

m is an integer, 1, 2 or 3 and

n is an integer, 1 or 2 or is zero

with the proviso that the sum of m and n is 3 and the

organophosphorus compound contains a total of at least 12 carbon atoms

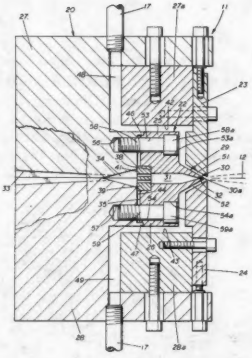
and contacting the organic medium before or during the extraction with a sulphuric acid solution or a metal salt containing sulphuric acid solution to produce a titanyl sulfate-rich organic phase and a foreign metals-rich aqueous phase, separating the organic phase from the aqueous phase and re-extracting titanyl sulfate from the organic phase with water or a dilute aqueous sulfuric acid or titanyl sulfate containing solution.

4,986,743

MELT BLOWING DIE

Peter G. Buehning, Short Hills, N.J., assignor to Accurate Products Co., Hillside, N.J.

Filed Mar. 13, 1989, Ser. No. 322,562
Int. Cl.[5] B29C *47/30;* D01D *5/08*
U.S. Cl. 425—7 **9 Claims**



1. A meltblowing die comprising:

(a) enlongate die tip having an outwardly extending triangular nose piece terminating in an apex region, an internal molten polymer flow channel, and a plurality of orifices formed in the apex region and being in fluid communication with the flow channel and being arranged in side-by-side relation forming a row;

(b) a die body having air flow passages formed therein for delivering air to opposite sides of the nose piece, and polymer flow cavity for delivering molten polymer to the flow channel in the die tip; and

(c) mounting means for securing said die tip on the die body and for applying equal forces on opposite sides of the row of orifices in the apex region of the triangular nose piece, said forces acting in a direction on the nose piece inwardly toward said orifices thereby maintaining the apex region in compression.

4,986,744

APPARATUS FOR MANUFACTURING MULTI-LAYERED CONCRETE ROOF TILES

Manfred Weisweiler, Dreieichenhain, and Günter Jöst, Rodgau, both of Fed. Rep. of Germany, assignors to Braas GmbH, Fed. Rep. of Germany

Filed Oct. 5, 1988, Ser. No. 253,533
Claims priority, application Fed. Rep. of Germany, Mar. 18, 1988, 3809162
Int. Cl.[5] B28B *11/08;* B20B *19/00;* B29C *47/06*
U.S. Cl. 425—94 **6 Claims**

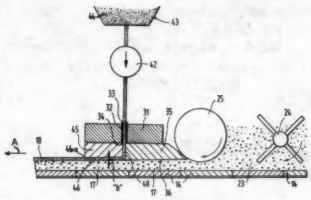
1. Apparatus for extruding multi-layered roof tiles comprising:

a continuous loop of a plurality of bottom molds for said roof tiles;

first green concrete supply means for feeding green concrete into said bottom molds and forming a first layer of green concrete therein;

a green concrete compacting roll and a first green concrete smoothing member positioned immediately downstream from said first green concrete supply means for compacting and shaping said first layer of green concrete passing thereunder on said bottom molds;

a second green concrete smoothing member positioned downstream from said first concrete smoothing member and separated therefrom by a gap for introducing a second layer of green concrete onto said first layer;



second green concrete supply means for supplying a second green concrete material;

green concrete feeding means for feeding said second green concrete from said second green concrete supply means through said gap and onto said first layer of green concrete to form a second layer of green concrete, said feeding means including a pump for feeding green concrete through said gap under high mechanical pressure; and,

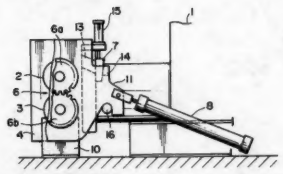
means for moving said plurality of bottom molds lengthwise in said apparatus wherein said first and second smoothing members are retained in place by a bridge member which spans the width of the bottom molds and includes at least one channel formed therein and having an inlet in communication with said pump and an outlet opening into the gap between said smoothing members.

4,986,745

ROLLER HEAD OPENING AND CLOSING APPARATUS IN ROLLER HEAD EXTRUDER

Katsunobu Hagiwara, Kobe, Japan, assignor to Kabushiki Kaisha Kobe Seiko Sho, Kobe, Japan

Filed Jul. 13, 1989, Ser. No. 379,367
Int. Cl.[5] B29C *47/08*
U.S. Cl. 425—182 **7 Claims**



1. A roller head opening and closing apparatus in a roller head extruder, comprising:

parallel upper and lower rollers disposed at an extrudate outlet end of the extruder and having axes extending orthogonal to the longitudinal axis of the extruder;

two frames which rotatably journal respective opposite ends of said rollers;

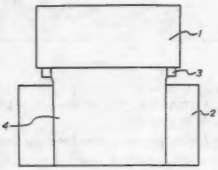
drive means for rotating said lower roller;
power transmission means for transmitting a rotation of said lower roller to said upper roller;
support means independent of said frames for supporting said lower roller, whereby said frames may pivot about the axis of said lower roller;
lock means for locking said frames at a pivotal position in which the roller axes lie in a single same vertical plane; and
swing means for pivoting said frames about the axis of said lower roller such that said upper roller is swung away from the extrudate outlet, whereby a maintenance space is created between the extrudate outlet and said upper roller.

4,986,746

APPARATUS FOR PREPARING POLYMER FILM

Mitsugu Hosoi, Shiga, Japan, assignor to Diafoil Company, Limited, Tokyo, Japan

Filed Aug. 8, 1989, Ser. No. 390,759
Claims priority, application Japan, Aug. 11, 1988, 63-200667
Int. Cl.[5] B29C *47/14*
U.S. Cl. 425—224 3 Claims



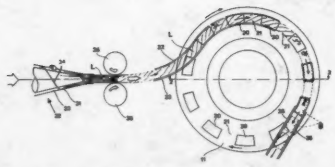
1. An apparatus for the continuous preparation of polymer film comprising:
a T-die having neck-down prevention pieces, wherein a molten thermoplastic polymer is extruded through said T-die onto a rotating cooling drum, and wherein said neck-down prevention pieces are made of aluminum or alumina and are provided with a cooling device through which a cooling gas is circulated.

4,986,747

PROCESSING CROP MATERIAL

Keith Broomhall, Norwich, England, assignor to Barrico Limited, London, England

Filed Jan. 21, 1986, Ser. No. 821,016
Int. Cl.[5] B28B *11/12;* B30B *11/16*
U.S. Cl. 425—519 1 Claim



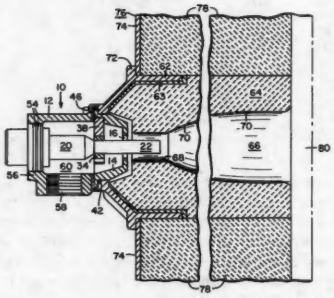
1. Apparatus for compacting fibrous material comprises precompression means for compressing loose fibrous material to form a length of compressed material, compacting means for compacting the length of material and forming the material into compacted discrete blocks or briquettes, the compaction means including a pair of rotary disk members rotatable in the same direction about axes inclined relative to one another, drive means for the rotary members, a row of pockets in the disk members in which the material is to be received and compacted, the pockets extending continuously around the rotary members and the pockets being defined by a row of spaced apart pockets around one of the rotary members and a similar row of spaced apart pockets around the other rotary members, the pockets on one rotary member registering with spaces between the pockets of the other rotary member, the disk members defining between them a wedge-like space in which the length of material is received and, during rotation of the rotary members, the material being progressively compressed in said space and into the pockets as the material approaches a region of maximum convergence of the disk members at which maximum compaction of the material takes place, the compaction means further comprising feed means for feeding the compressed length of material to the space, and discharge means for discharging compacted discrete blocks or briquettes of material from the pockets; wherein the precompression means includes apparatus for forming loose fibrous material into a twisted rope of compressed material.

4,986,748

WIDE RANGE OXY-FUEL BURNER AND FURNACE OPERATION

John T. Brown, Corning, N.Y., and John Kosco, Belle Vernon, Pa., assignors to Corning Incorporated, Corning, N.Y.

Filed Dec. 15, 1989, Ser. No. 451,258
Int. Cl.[5] F23M *9/00*
U.S. Cl. 431—188 11 Claims



1. An oxygen-fuel burner assembly which comprises:
a burner housing having a nose portion.
a central annular opening formed through said nose portion,
a fuel inlet assembly positioned within said housing and having a burner tip portion extending through said central annular opening of said nose portion,
means for axially centering said burner tip portion within said central annular opening,
means for supplying fuel through said fuel inlet assembly to an outlet end of said burner tip portion,
means for supplying oxygen to said burner housing for flow about said fuel inlet assembly within a chamber formed between said housing and said fuel inlet assembly and for discharge through said annular opening along the outer circumference of said burner tip portion extending through said nose portion for delayed combustion with the fuel adjacent said outlet end, and
said means for axially centering said burner tip portion including a centering spider member, said spider member having a central hub with a precision bore axially coincident with the axis of said central annular opening for slidably receiving and positioning said burner tip portion centrally of said central annular opening.

4,986,749

METHOD FOR DETERMINING A LEAK IN A BREAST WALL OF A REGENERATIVE HEAT RECUPERATOR

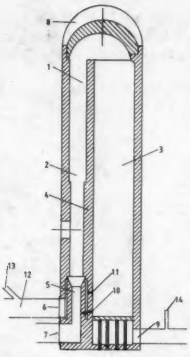
Cornelis N. A. Prast, Limmen, and Lambertus Veld, Alkmaar, both of Netherlands, assignors to Hoogovens Groep B.V., IJmuiden, Netherlands

Filed Jan. 31, 1990, Ser. No. 473,053

Claims priority, application Netherlands, Dec. 8, 1989, 8900318

Int. Cl.[5] F27D *17/00*

U.S. Cl. 432—28 9 Claims



1. Method for determining a leak in a breast wall of a regenerative heat recuperator having a combustion chamber and a heat storage chamber containing a heat storage medium adjacent to the combustion chamber and separated therefrom by a breast wall, the combustion chamber having inlet means for fuel and air and the heat storage chamber having outlet means for the flue gases which pass into it from the combustion chamber, the method comprising the steps of

(i) while passing gas through said recuperator, introducing via said inlet means a marker gas which undergoes an irreversible change at a temperature prevailing in the recuperator, and

(ii) detecting the presence of said marker gas in the gases passing out of said outlet means.

4,986,750

FURNACE

Hidasato Sakamoto, Chiba, Japan, assignor to Furnace Juko Kabushiki Kaisha, Saitama, Japan

Filed May 30, 1989, Ser. No. 358,076

Claims priority, application Japan, May 31, 1988, 63-134244; Jul. 29, 1988, 63-190346

Int. Cl.[5] F27B *9/02*

U.S. Cl. 432—131 13 Claims

1. A furnace for applying heat treatment for works, comprising,

a furnace wall for forming a casing of the furnace and having at least one opening,

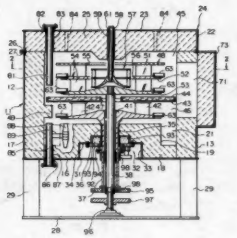
a partition horizontally situated inside the furnace wall for vertically dividing the furnace into at least first and second furnace chambers,

a first turntable horizontally and rotationally situated inside the first furnace chamber, said first turntable supporting the works thereon,

a second turntable horizontally and rotationally situated inside the second furnace chamber, said second turntable supporting the works thereon,

means for rotating the first and second turntables, said rotating means being connected to the first and second turntables to independently rotate the same at predetermined speed,

means for transferring works onto and from the first and second turntables through the opening of the furnace wall,



first heating means situated inside the first furnace chamber to keep temperature inside the first furnace chamber at predetermined temperature, and

second heating means situated inside the second furnace chamber to keep temperature inside the second furnace chamber at predetermined temperature.

4,986,751

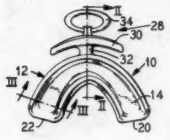
INFANT GUIDANCE PACIFIER APPLIANCE

Earl O. Bergersen, 950 Green Bay Rd., Winnetka, Ill. 60093

Filed May 30, 1989, Ser. No. 358,436

Int. Cl.[5] A61C *3/00*

U.S. Cl. 433—6 13 Claims



1. An orthodontic appliance of the type which is generally U-shaped in plan view and which includes a pair of oppositely directed tooth receiving troughs for the upper and lower rows of a patient's teeth, said troughs being formed between a labial buccal flange and lingual flange and terminating substantially at a distal side of the patient's canine teeth, and further including a manual grasping portion to be exposed on the exterior of the patient's mouth with a connecting portion passing between the patient's lips to secure the grasping portion to the U-shaped portion.

4,986,752

CUSHIONED CLAMP FOR SECURING A DENTAL DAM

R. Garry Graves, 945 Woodside Place, Victoria, British Columbia, Canada V8Y 2P3

Filed Dec. 16, 1987, Ser. No. 134,214

Int. Cl.[5] A61C *5/12*

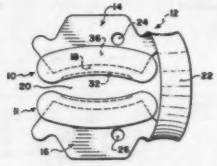
U.S. Cl. 433—138 2 Claims

1. In combination:

a dental rubber dam clamp having opposing jaw members with concave inside edges for engaging a tooth, said clamp having a resilient member interconnecting the jaw members and biasing the jaw members toward each other; and

a cushion for at least one said jaw member fitted on said inside edge of said at least one jaw member, the cushion being elongated, and having a front face for engaging the

tooth, a rear face, and a slot-like opening extending into said rear face towards the front face, the slot-like opening



closely receiving said at least one jaw member, the front face having at least one elongated tooth engaging ridge extending therealong.

4,986,753

DIRECT ASSEMBLY FRAMEWORK FOR AN OSSEOINTEGRATED IMPLANT

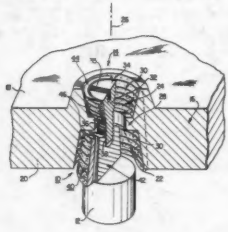
Grady C. Sellers, Rte. 3, Box 79, Sulphur Springs, Tex. 75482

Continuation-in-part of Ser. No. 181,919, Apr. 15, 1988, Pat. No. 4,915,629. This application Apr. 9, 1990, Ser. No. 506,693

The portion of the term of this patent subsequent to Apr. 10, 2007, has been disclaimed.

Int. Cl.[5] A61C *13/12*

U.S. Cl. 433—172 **11 Claims**



1. A framework for a fixed/detachable prosthesis that is assembled intraorally onto at least one abutment supported by an osseointegrated implant, the framework comprising:

a cast member having an upper surface for supporting an aesthetic veneer and a lower surface having a recess therein, the cast member having fastener support means located above the recess and comprising a flange and a retaining wall projecting out from an upper edge of the flange;

a sleeve supported on the abutment between the abutment and the recess in the lower surface;

a fastener supported in the retaining wall for securing the cast member to the abutment; and

cement means located in the recess in the lower surface to provide accurate adaptation of the cast member to the abutment upon installation of the cast member.

4,986,754

THERMOPLASTIC AND INJECTABLE ENDODONTIC FILLING COMPOSITIONS

Tiang-shing Chang, Westfield, and Lisa N. W. Marchese, Cresskill, both of N.J., assignors to Block Drug Co., Inc., Jersey City, N.J.

Division of Ser. No. 244,291, Sep. 15, 1988, Pat. No. 4,950,697. This application Jul. 2, 1990, Ser. No. 546,903

Int. Cl.[5] A61C *5/02*

U.S. Cl. 433—224 **4 Claims**

1. A method for forming a filled dental root canal substantially without voids in said canal comprising injecting at a clinically acceptable elevated temperature a nonshrinkable, thermoplastic endodontic filling composition comprising a mixture of transpolyisoprene and a plasticizing amount of at least one liquid Ricinoleate ester plasticizer into said canal, said filling composition being compounded to form an injectable filling for said canal, said filling solidifying at body temperature to form a final homogeneous dense mass in said root canal substantially without voids between said final mass and said canal, wherein said transpolyisoprene has a molecular weight of about 30,000 to 100,000.

4,986,755

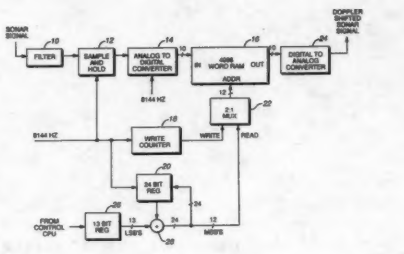
ACOUSTIC TARGET DOPPLER SIMULATOR

James K. Johnson, Placentia, Calif., assignor to The United States of America as represented by the Secretary of the Navy, Washington, D.C.

Filed Mar. 28, 1990, Ser. No. 501,074

Int. Cl.[5] G09B *9/00*

U.S. Cl. 434—008 **1 Claim**



1. A method of simulating Doppler shifting of a record sonar signal comprising the steps of:

(a) digitizing the signal at a fixed write rate,

(b) storing the digitized signal in a random access memory having a lowest and a highest address and a fixed number of storage locations between, said storing being done at sequential addresses until said highest address is reached, a next address after highest address being said lowest address,

(c) determining a read rate which is different from said fixed write rate by an amount sufficient to achieve the desired amount of Doppler shifting,

(d) reading the signal from said random access memory at said read rate, such that when said read rate exceeds said write rate and a read address thereby catches up to a write address, previous data sequence of all locations in storage is repeated, and

(e) converting the digital signal read from memory to analog signal.

4,986,756

ARTISTIC TOY

Naoki Yamaguchi, Nagoya, Japan, assignor to Nichigan Co. Ltd., Aichi, Japan

Filed Dec. 28, 1988, Ser. No. 291,170

Int. Cl.[5] G09B *1/16*

U.S. Cl. 434—96 **6 Claims**

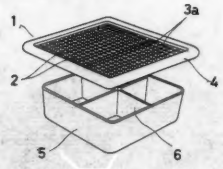
1. An artistic toy kit for producing a variety of creative designs and pictures, said kit comprising

(a) a support structure (1) that includes a rectangular bottom plate and a plurality of partition walls (3*a*) projecting upwardly from the bottom plate so as to define a plurality of cells (2) that have sides and bottoms but open tops,

(b) a plurality of blocks (7, 8) that are sized and contoured to fit within said plurality of cells (2),

(c) at least one block remover (9) which is adapted to engage

the upper surfaces of said blocks (7, 8) in such a way as to facilitate removal of said blocks (7, 8) from said cells (2), (d) a storage container (5) for said plurality of blocks, said container having an upper opening that has an area substantially corresponding to the area of said rectangular bottom plate set forth in (a), and



(e) engaging means (4a) on the underside of said support structure (1) and engaging means (5a) adjacent the upper opening of said storage container (1) that are contoured so as to engage with each other so that support structure (1) can serve as a closure lid for said storage container (5).

4,986,757

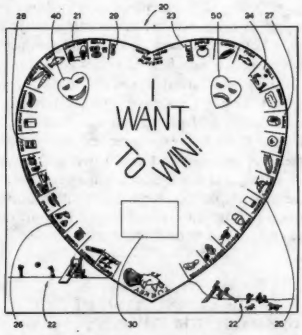
NUTRITION AND EXERCISE EDUCATION GAME AND METHOD OF PLAY THEREOF

Laverne J. Mueller, 5491 Crathes Ct., St. Louis, Mo. 63119

Filed Sep. 8, 1989, Ser. No. 404,588

Int. Cl.[5] G09B *19/00*

U.S. Cl. 434—127 **8 Claims**



1. A method of teaching good health habits and normative values to three to six year old children utilizing a board game which presents information to the children that reinforces nutritional and exercise habits capable of producing a healthy cardiovascular system, wherein each player selects a playing piece to represent said player and in turn operates a chance determining means to select a first player; said first player, and each player in turn, then operates said chance determining means and moves said playing piece in discrete steps along a playing path in accordance with the respective integer selected by said chance determining means, wherein said path consists of a start space, a plurality of intermixed food spaces and exercise spaces, and an end space and wherein said food spaces include foods from each of the basic four food groups and wherein said exercise spaces include activities which promote physical fitness resulting in good health, draws one game card from a deck of game cards after said player's playing piece comes to rest after transversing the aforementioned discrete steps, reads said game card which contains a statement which imparts information relating to parameters affecting individual health together with directions for the next action to be taken by said player, follows the directions given to said player by said game card, returns said game card to the bottom of the deck, and draws a positive game token or a negative game token in accordance with said directions form a container holding a plurality of said game tokens, and wherein after each player has successfully transversed the entire playing path, each player matches said game tokens drawn by said player so that one positive game token is matched with one negative game token, discards each matched set of game tokens, and tallies any remaining positive game tokens, and wherein the respective totals of positive game tokens retained by each player are then compared to select as the winner the player having the greatest remaining total of positive game tokens.

4,986,758

ELECTRICAL CONNECTOR

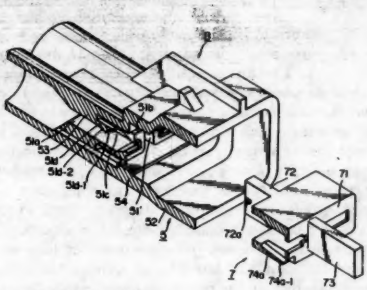
Shigekazu Wakata, Mie, Japan, assignor to Sumitomo Wiring System, Ltd., Yokkaichi, Japan

Filed Feb. 22, 1989, Ser. No. 313,605

Claims priority, application Japan, Feb. 23, 1988, 63-40232

Int. Cl.[5] H01R *13/424*

U.S. Cl. 439—595 **2 Claims**



1. A connector comprising:

a pair of housings each having a pair of tubular portions having passages therein for having terminals introduced thereinto in one direction along the length of said passages and being accomodated in said passages, said tubular portions having cuts in one of the side walls thereof for defining cantilever-like resilient arms having projections on the free ends thereof and extending in the direction in which terminals are introduced into said passages for locking terminals in said passages by causing said projections to fit in recesses in the terminals accomodated in the passages;

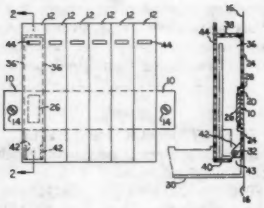
a fixing member movable over the portions of said tubular portions to a finally locked position where said resilient arms are provided, said fitting means having temporary locking means thereon for temporarily locking said fixing member onto said tubular portions at a temporarily locked position spaced from the portions of the side wall of said tubular portions where said resilient arms are provided, said tubular portions in one of said housings being parallel to each other and spaced in a direction normal to the side walls to form a gap therebetween, and said fixing member on the tubular portions of the other of said housings further having a guide piece thereon projecting in a direction away from said other housing and fittable into said gap, whereby when said connector is assembled by moving said housings toward each other, said guide piece moves into said gap between said tubular portions on said one housing for guiding terminals in said other housing into the tubular portions of said one housing, and at the same time said fixing member on the tubular portions of said other housing is moved onto said tubular portions of said other housing from the temporarily locked position to the finally locked position thereof.

4,986,759

TOOTHBRUSH CABINET

Elizabeth S. Duncan, 14621 Gimbel Dr., Chester, Va. 23831

Filed Nov. 13, 1989, Ser. No. 435,618
Int. Cl.[5] A47G *29/08*
U.S. Cl. 312—206 **1 Claim**



1. A toothbrush storage mechanism comprising a flat magnetically permeable mounting plate adapted for facial placement against a bathroom wall; a series of rectangular toothbrush containment boxes affixable to the exposed face of said mounting plate; each box being large enough to contain only one toothbrush; each box comprising a rear wall **(24)** having a flat permanent magnet carried thereon for placement against the magnetically permeable mounting plate, whereby each said box is magnetically attached to the mounting plate; each permanent magnet having sufficient magnetic force to retain the associated box on the mounting plate, while permitting the box to be manually removed from the plate for disposition in a suitcase; the individual boxes being oriented vertically alongside one another on the mounting plate so that the individual toothbrushes extend vertically in parallelism with one another;

each box comprising the aforementioned rear wall and a vertically elongated tray having a pivotable connection with the box rear wall at its lower edge, whereby the tray can be manually moved between an upright storage position and a prone toothbrush loading position extending horizontally away from said rear wall;

each box rear wall having two laterally spaced ears extending therefrom at its lower edge; each tray comprising a vertically elongated front wall, two vertically elongated side walls extending normal to the front wall, a top wall extending normal to the front wall, and a bottom wall extending normal to the front wall, and pivot pins extending from the tray side walls through said laterally spaced ears to form pivotal connections between the tray and the rear wall;

the tray side walls extending from the tray front wall into abutment with the box rear wall when the tray is in its upright storage position, the space between the tray side walls being open and completely unobstructed so that when the tray is in its prone position a toothbrush can be deposited into the tray by laying it directly against the upwardly facing surface of the tray front wall;

each said tray bottom wall extending from the associated front wall a lesser distance than the spacing between the tray front wall and box rear wall, so that when the tray is swung down to its prone position the tray bottom wall will be vertically oriented in the space directly below the box rear wall;

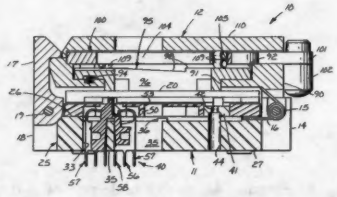
the individual boxes being oriented on the mounting plate so that the side walls on adjacent trays are in near adjacency to each other, with minimal clearance between the trays whereby the boxes present a unitary modular appearance.

4,986,760

SOCKET FOR TAB BURN-IN AND TEST

Kurt H. Petersen, and Juan P. Rios, both of Austin, Tex., assignors to Minnesota Mining and Manufacturing Company, St. Paul, Minn.

Filed May 19, 1989, Ser. No. 354,903
Int. Cl.[5] H01R *9/09*
U.S. Cl. 439—71 **16 Claims**



1. In a socket for test and burn-in of an integrated circuit device, mounted for example on a tape having a plurality of pads connected to paths to the leads of the device, a comb and contact member comprising;

a support for a plurality of contacts, said support having a first surface which will be disposed in a plane generally parallel to a said tape and a wall having a face generally perpendicular to said plane and means for retaining said contacts in spaced relationship along said wall,

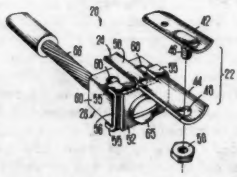
each contact having a contact end for making pressure contact with a pad on a said tape, an intermediate body portion affording movement of said contact end, and a connecting end for making connection with a piece of electronic equipment, said contact end having a straight portion contacting said face of said wall and connected to a first flex of said intermediate portion affording movement of said contact end and straight portion generally perpendicular to said plane, and said first flex area being joined to a curved arcuate second flex area affording movement of said contact end toward the wall of said support when said contact end engages a said tape, and said intermediate portion having a further contact anchoring portion to hold the contact to said support and join the contact end to said connecting end.

4,986,761

CABLE CONNECTING DEVICE

Robert H. Gladden, Jr., G16 JMHP, Norcross, Ga. 30093, and Phillip M. Thomas, 1047 Helen St., Lake City, Ga. 30260

Filed May 26, 1989, Ser. No. 358,991
Int. Cl.[5] H01R *4/66*
U.S. Cl. 439—99 **11 Claims**



1. A device which is adapted to be secured to a cable and which is connectable electrically to at least a portion of the cable, said device comprising:

a first cable engagement means for being engaged with and secured to an interior portion of the cable, said first cable

engagement means including two cooperating arcuately shaped portions, one of which includes a portion upstanding at an angle thereto;

a second cable engagement means which is adapted to become engaged with a plastic jacket of the cable which jacket encloses the interior portion of the cable, said second engagement means including a portion upstanding at an angle thereto which is adapted to be secured to said upstanding portion of said first cable engagement means; and

bonding block means adapted to be connected to said upstanding portions of said and second cable engagement means for receiving at least one end portion of a ground wire.

4,986,762

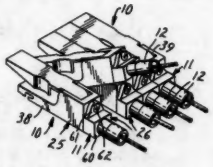
TERMINATION MODULE FOR USE IN AN ARRAY OF MODULES

Roger H. Keith, St. Paul, Minn., assignor to Minnesota Mining and Manufacturing Company, St. Paul, Minn.

Filed Aug. 15, 1989, Ser. No. 394,127

Int. Cl.[5] H01R *13/73*; G02B *6/36*

U.S. Cl. 439—131 **18 Claims**



1. A module for use in terminating a communication transmission line at a distribution panel comprising

a connector adapted to be connected to one end of a transmission line,

support means for supporting said connector, said support means comprising an end wall having two faces for supporting said connector in fixed position thereon and a rectangular base joined to said end wall at one end thereof and extending in a direction away from one face thereof, said base comprising an elongate narrow strip having a top surface and a bottom surface, means defining an axis transverse to said bottom surface for affording tilting movement of said base to move said end wall from a first normal position to a spaced position for affording easy access to said connector, said means defining said axis transverse to said bottom surface comprises a recess spaced from said end wall for receiving a rod about which said base may pivot, said recess including an offset area for receiving a said rod, and said base includes a portion extending away from said recess in a direction opposite said end wall defining stop means for limiting said tilting movement.

4,986,763

CONTACT STRIP-TO-FLEX BUSHING CONNECTOR

Dennis J. Boyle, Menlo Park, Calif., assignor to Dynabook Technologies Corporation, Westlake Village, Calif.

Filed Mar. 6, 1989, Ser. No. 319,156

Int. Cl.[5] H01R *35/00*

U.S. Cl. 439—165 **18 Claims**

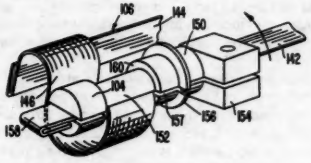
1. Apparatus for securing an electrical conductor for extension between a fixed member and a pivoted member mounted for angular movement with respect to said fixed member, comprising:

means for securing said electrical conductor at one end to said fixed member;

means for securing said electrical conductor at the other end to said pivoted member;

a generally cylindrical body forming a shaft fixed to said pivoted member for journalled movement in said fixed member;

means on said shaft for windingly receiving a first portion of said conductor intermediate the ends thereof and extending from said fixed member;



an axially extending separation in said shaft forming opposed semicylindrical body portions securing a second portion of said conductor adjacent said first portion therebetween coincident with the movement of the movable end of said conductor, said first portion of said conductor extending to said separation radially over the external surface of said shaft and said second portion of said conductor being substantially parallel to said separation in extending to said pivoted member.

4,986,764

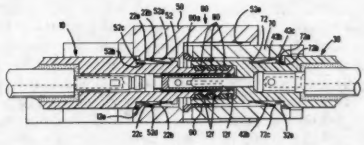
HIGH VOLTAGE LEAD ASSEMBLY AND CONNECTOR

Daniel G. Eaby, Marietta; James P. Scholz, New Cumberland; David T. Shaffer, Mechanicsburg; Walter C. Shatto, Jr., Harrisburg, and Brent D. Yohn, Newport, all of Pa., assignors to AMP Incorporated, Harrisburg, Pa.

Filed Oct. 31, 1989, Ser. No. 429,446

Int. Cl.[5] H01R *13/00*

U.S. Cl. 439—275 **26 Claims**



1. In combination, matable elements of a single-lead assembly suitable for use in a high voltage electrical circuit to electrically connect first and second electrical conductors to one another in an environment having at least substantial pressure variations, comprising:

a plug element, said plug element comprising:

a first annular member formed from a material having good insulating and dielectric properties, said first annular member having a first passageway extending threrethrough from a forward end to a rearward end thereof;

a socket terminal formed from an electrically conductive material adapted to be disposed in said first passageway of said first annular member at a location adjacent said forward end thereof, said socket terminal having a socket contact section which is disposed within a reduced dimensioned forward plug portion of said first annular member and is adapted to receive an elongate pin contact section thereinto through said forward end of said first annular member upon mating, said socket terminal further having a wire-connecting rearward portion which is adapted to be connected to a conductive portion of a first electrical conductor in electrically conductive relationship.

said rearward portion of said first passageway being larger transversely than the insulatively jacketed portion of the first electrical conductor to receive a first means to sealingly fill the first annular space after insertion thereinto of said first conductor terminated to said socket terminal, to thereby prevent voltage discharge and minimize corona formation thereat when the lead assembly is operated at high voltage; and

a receptacle element, said receptacle element comprising:

a second annular member formed from a material having good insulating and dielectric properties, said second annular member having a passageway extending therethrough from a forward end to a rearward end thereof, and

a pin terminal formed from an electrically conductive material adapted to be disposed in said passageway of said second annular member at a location adjacent said forward end thereof, said pin terminal having an elongate pin contact section which is surrounded by a portion of said second annular member and which forms a receptacle portion defining an elongate annular space around said pin contact section, said pin contact section of said pin terminal being adapted to be received in said socket contact section of said socket terminal upon mating into an electrically relationship therewith, said pin terminal further having a wire-connecting rearward portion which is adapted to be connected to a conductive portion of a second electrical conductor in electrically conductive relationship,

said rearward portion of said second passageway being transversely larger than the insulatively jacketed portion of the second electrical conductor to receive a second means to sealingly fill the third annular space after insertion thereinto of said second conductor terminated to said pin contact terminal, to thereby prevent voltage discharge and minimize corona formation thereat when the lead assembly is operated at high voltage; and

said reduced dimension plug portion of said first annular member being snugly received into said receptacle portion of said second annular member upon mating resulting in minimal gas contained therewithin upon mating, one of said receptacle portion and said plug portion including compressible sealing means secured against axial movement therealong and cooperable with a facing surface of the other of said receptacle and plug portions to be compressed thereby to define a tight fit therebetween at a plurality of axially spaced locations for retention of said plug and receptacle elements together and assured electrical and environmental sealing therebetween at a plurality of axially spaced locations, upon said plug portion being received into said receptacle portion during mating of said lead assemblies,

whereby matable single-terminal plug and receptacle elements for a matable single-lead assembly are defined to be secured onto respective conductor wires and having integral retention and sealing means preventing voltage discharge and minimizing corona formation thereat during in-service use in extreme environments when terminated onto respective conductor wires and mated, independent of any housing member within which the single-lead assembly may be disposed.

4,986,765

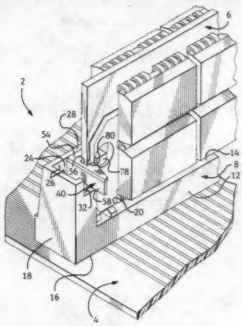
INSERTABLE LATCH MEANS FOR USE IN AN ELECTRICAL CONNECTOR

Iosif Korsunsky, Harrisburg; Richard C. Schroepfer, Thompsontown, and Monte L. Kopp, Tower City, all of Pa., assignors to AMP Incorporated, Harrisburg, Pa.

Filed Feb. 21, 1989, Ser. No. 313,261
Int. Cl.[5] H01R *9/09*
U.S. Cl. 439—326 **19 Claims**

1. An electrical connector for connecting a first substrate to a second substrate, the second substrate being rotatable relative to the first substrate between a first and second position, the electrical connector having a housing with a recess provided therein, the recess extends from proximate a first end of the housing to proximate a second end of the housing, and is dimensioned to receive the second substrate therein, contact terminals are positioned adjacent to the recess, and are configured to make an electrical connection with the second substrate when the second substrate is in the second positioned in the recess, the electrical connector comprising:

a latch receiving cavity provided in the housing and extending from a first surface of the housing toward a second surface, the latch receiving recess positioned proximate to



the first end of the housing and proximate the recess of the housing;

a separate resilient latching means positioned in the latch receiving cavity, the latching means having a mounting portion which is positioned in the latch receiving cavity, and a latching portion which extends from the latch receiving cavity toward the recess;

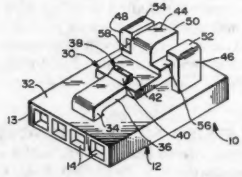
whereby as the second substrate is rotated from the first position to the second position, the latching portion of the latching means cooperates with the second substrate to maintain the second substrate in the second position.

4,986,766

ELECTRICAL CONNECTOR HAVING ANTI-OVERSTRESS LATCH

Russell J. Leonard, Downers Grove; Michael J. Miskin, Naperville, both of Ill., and Ross E. Schroll, East Rochester, N.Y., assignors to Molex Incorporated, Lisle, Ill.

Continuation of Ser. No. 232,985, Aug. 17, 1988, abandoned.
This application Aug. 28, 1989, Ser. No. 399,048
Int. Cl.[5] H01R *13/627*
U.S. Cl. 439—352 **26 Claims**



1. An electrical connector comprising a housing having at least one external surface, a resilient deflectable latch having a base portion on said external surface and a deflectable portion in spaced relationship to said external surface, said deflectable portion being cantilevered relative to said base portion, a pair of anti-fishhook ribs extending from said external surface in spaced relationship to said deflectable portion of said latch and

generally adjacent a portion of said latch remote from said base portion, said anti-fishhook ribs inhibiting extraneous materials from hooking onto said latch remote from said base portion, and anti-overstress means extending from at least one of said anti-fishhook ribs for limiting deflection of said deflectable portion of said latch relative to said external surface of said housing.

4,986,767

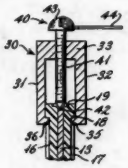
BLADE FUSE POWER TAP

Emmett L. Kozel, Rte. 1 Box 206, Rockingham, N.C. 28379

Filed Apr. 23, 1990, Ser. No. 512,441

Int. Cl.[5] H01R *4/36, 13/68*

U.S. Cl. 439—621 16 Claims



1. A power tap for use with flat terminal blade miniature plug-in fuses of the type having a housing which includes front and rear surfaces and an upper end and at least one opening in the upper end and which further includes a terminal blade having a portion which is accessible through the opening, the power tap comprising, a clamp means having a head portion and spaced leg portions, an opening through said head portion and intermediate said leg portions, said leg portions being engagable with the front and rear surfaces of the housing of the fuse when said clamp means is mounted thereto, a terminal element mounted within said opening in said head portion and being selectively movable axially with respect thereto, said terminal element having an elongated shank having a lower electrical contact portion and an upper end portion, and an electrical contact member extending from said upper end portion, whereby said terminal element may be selectively adjusted with respect to said opening through said head portion so that said contact portion is movable with respect to said leg portions of said clamp means so as to be selectively urged within the opening in the housing to thereby selectively contact the portion of the terminal blade which is accessible through the opening in the fuse housing.

4,986,768

PLUG CONNECTOR FOR TELECOMMUNICATION AND DATA SYSTEMS

Wilhelm Brumkamp, and Gunter Hegner, both of Berlin, Fed. Rep. of Germany, assignors to Krone AG, Berlin, Fed. Rep. of Germany

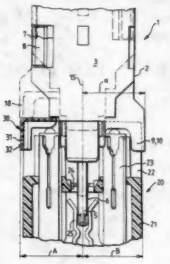
Filed Dec. 1, 1989, Ser. No. 444,762

Claims priority, application Fed. Rep. of Germany, Dec. 2, 1988, 3841083

Int. Cl.[5] H01R *13/64*

U.S. Cl. 439—680 6 Claims

1. A telecommunications plug connector arrangement, comprising: a connector, including a connector housing and a connector tongue, supported by said connector housing and joined to said connector housing at a lower edge of said connector housing, said connector tongue having contact tracks; a connector/disconnector bank having parallel rows of clamping contact slots, each clamping contact slot including a contact element, and a center row of plug openings with contact springs for receiving an assigned tongue with contact tracks, said connector/disconnector bank being symmetrical about a longitudinal central axis; a projection connected to side of said connector housing, said projection extending beyond said lower edge of said connector housing; and, a cover engaging and covering one row of said clamping contact slots, so that in the event of misinsertion of said connector, said cover



and said projection cooperate thereby preventing a connector tongue from being positioned incorrectly in a corresponding plug opening.

4,986,769

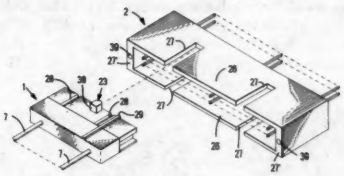
POLARIZATION AND KEYING MECHANISM

Charles N. Adams, III, Harrisburg, and Leroy J. Morningstar, Middletown, both of Pa., assignors to AMP Incorporated, Harrisburg, Pa.

Filed Nov. 16, 1989, Ser. No. 438,285

Int. Cl.[5] H01R *13/64*

U.S. Cl. 439—681 12 Claims



1. Polarizing and keying features comprise, a first connector provided with a polarizing structure and keying structure, a complementary housing provided with a receiving end for receiving the polarizing structure and the keying structure of the first connector, wherein the improvement comprises; the complementary housing is provided with a receiving end having multiple connector positions each defined by complementary polarizing means for receiving the polarizing structure of the first connector, the complementary housing includes a frame on the receiving end having complementary keying means aligned with the keying structure of the first connector and aligned with a single one of the multiple connector positions, a fastener connects the frame to the complementary housing, and an adapter connects to the fastener and to a mounting fastener that connects the complementary housing to a printed circuit board.

4,986,770

ELECTRICAL EXTERNAL CONNECTOR

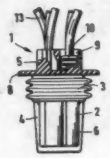
Bernd Zinn, Ennepetal, and Srboslav Lolic, Wuppertal, both of Fed. Rep. of Germany, assignors to Grote & Hartmann GmbH & Co. KG, Fed. Rep. of Germany

Filed Aug. 18, 1989, Ser. No. 395,641

Claims priority, application Fed. Rep. of Germany, Sep. 22, 1988, 8812014[U]

Int. Cl.[5] H01R *13/436*

U.S. Cl. 439—752 17 Claims



1. External connector with an additional lock for a multipolar electrical coupling, the connector including a connector housing and an additional locking element, with the connector housing having contact element chambers **9** organized next to each other in a line, each chamber having a connector opening in the bottom and an opposite insertion opening, with a slider core opening being located adjacent the connector opening, and with the additional locking element having a bottom plate that forms the connector profile of the external connector, characterized by:

vertical flexible spring locking tongues **(24)** spaced parallel to each other along the bottom plate **(21)** of the additional locking element **(4)**, which in turn is set against a bottom wall **(14)** of the connector housing, with the flexible spring locking tongues having upper unconnected ends equipped with detents **(25)**; and

the detents **(25)** each penetrating a recess opening **(19)** providing access through the chamber wall to one of the chambers **(12)** of the connector housing **(2)**.

4,986,771

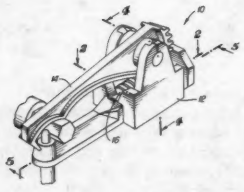
CLAMPING DEVICE

Richard R. Braswell, Long Beach, Calif., assignor to The Richards-Braswell Research Corporation, Signal Hill, Calif.

Filed Oct. 13, 1989, Ser. No. 121,279

Int. Cl.[5] H01R *4/38, 4/36, 11/03*

U.S. Cl. 439—790 10 Claims



1. A clamping device for directly contacting a terminal lead with variously shaped test items, said clamping device comprising:

a reference member having a first end, a second end and means for receipt of said terminal lead;

a pivoting member having means for engaging variously shaped test items, a gear portion, a first end and a second end, said pivoting member being pivotally mounted at said first end to said reference member, said means for engaging variously shaped items formed adjacent said second end and said gear portion formed at said first end;

gear means threadingly engaged with said pivoting member for pivoting said second end of said pivoting member from a first position to a second position spaced apart from said reference member.

4,986,772

ELECTRICAL CONNECTOR HAVING TERMINALS AND RETAINER FOR PROTECTING THE TERMINALS DURING TRANSPORTATION

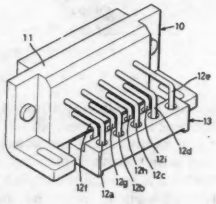
Iwao Fukutani, Nagaokakyo, Japan, assignor to Murata Manufacturing Co., Ltd., Kyoto, Japan

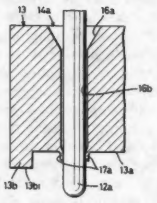
Filed Jan. 27, 1989, Ser. No. 302,324

Claims priority, application Japan, Jan. 27, 1988, 63-9247

Int. Cl.[5] H01R *23/70*

U.S. Cl. 439—892 10 Claims





1. A transportable unit comprising a right-angle type of electrical connector having a connector body, and a plurality of L-shaped spaced-apart terminals fixed to the connector body and extending there-from in the same direction; and retainer means being free of electrically conductive material for maintaining the spacing between said terminals and for preventing the terminals from being damaged during transportation of the unit,

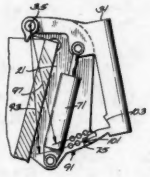
said retainer means comprising a retainer body defining a plurality of through-holes extending there-through, said through-holes having diameters that are respectively larger than diameters of said terminals over axial length-wise portions of said terminals, said axial length-wise portions of the terminals extending into said through-holes, respectively, and said retainer body having a broken thin film extending into at least one of said through-holes, said thin film being deformed and in elastic engagement with the axial length-wise portion of the terminal that extends into said at least one through-hole such that said retainer means is removably secured to said connector via said elastic engagement the unit being directly mountable on a printed substrate to form a right-angle plug-in assembly.

4,986,773

TRIM ADJUSTMENT ARRANGEMENT FOR MARINE PROPULSION DEVICE

Gregory J. Binversie, Grayslake, and James E. Macier, Beach Park, both of Ill., assignors to Outboard Marine Corporation, Waukegan, Ill.

Filed Sep. 14, 1989, Ser. No. 407,108
Int. Cl.[5] B63H 5/12
U.S. Cl. 440—61 22 Claims



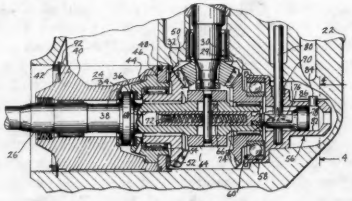
1. A marine propulsion device comprising a transom bracket adapted to be fixed to a boat transom and including means defining a pattern of apertures spaced from an axis extending horizontally through said transom bracket when said transom bracket is boat mounted and including a forwardmost aperture, said aperture pattern comprising a first series of spaced apertures located at a first distance from said axis and a second series of spaced apertures located at a second distance from said axis different from said first distance, a thrust pin selectively insertable into any one of said apertures, a swivel bracket connected to said transom bracket for pivotal movement about said axis relative to said transom bracket and including thrust transmission means for engagement with said thrust pin, said thrust transmission means comprising a first thrust transmitting surface located at said first distance from said axis, and a second thrust transmitting surface located at said second distance from said axis and spaced angularly about said axis from said first surface, and a cylinder/piston assembly having a first end connected to said swivel bracket and a second end connected to said transom bracket and extending below and forwardly of said pattern of apertures.

4,986,774

DESMODROMIC SHIFT ADAPTOR FOR A COUNTER-ROTATING PROPELLER SHAFT ASSEMBLY

David B. Wantz, Oshkosh, Wis., assignor to Brunswick Corporation, Skokie, Ill.

Filed Mar. 28, 1990, Ser. No. 500,698
Int. Cl.[5] B63H 21/28
U.S. Cl. 440—75 24 Claims



1. In a marine propulsion system comprising a depending gearcase including a rotatable shift shaft mounted thereto and a propeller shaft cavity toward its lower end within which is disposed a propeller shaft adapted to be rotatably driven by a drive shaft and forward and reverse gears disposed within said cavity for rotating a propeller connected to said propeller shaft, wherein said propeller shaft is provided with means for transferring forward thrust in said propeller shaft to said gearcase aft of the rearwardmost of said forward and reverse gears, an arrangement for facilitating assembly of a shifting mechanism and one of said gears within said cavity, comprising:

an adaptor member including means for rotatably supporting and fixing the position of the fore one of said forward and reverse gears within said gearcase cavity, said adaptor member further comprising means for mounting a movable shifting cam thereto and accomodating connection of said shift shaft to said shifting cam; and

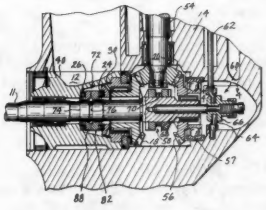
means for mounting said adaptor member within said gearcase cavity and fixing the position of said adaptor member relative to said gearcase.

4,986,775

PROPELLER SHAFT BIDIRECTIONAL THRUST BEARING SYSTEM

David B. Wantz, Oshkosh, Wis., assignor to Brunswick Corporation, Skokie, Ill.

Filed Jul. 6, 1989, Ser. No. 376,306
Int. Cl.[5] B63H 5/12
U.S. Cl. 440—83 11 Claims



1. In a marine propulsion system including a propeller shaft having an inner portion rotatably mounted within a housing and an outer portion projecting therefrom, and a propeller mounted to the projecting portion of said propeller shaft so as to be rotatable therewith, wherein rotation of said propeller shaft in a first direction results in an axial forward force on said propeller shaft acting substantially along the longitudinal axis of said propeller shaft, and rotation of said propeller shaft in a second direction results in an axial rearward force on said propeller shaft, the improvement comprising:

a recess formed about at least a portion of the circumference of the propeller shaft, with the propeller shaft transverse dimension forward of the recess being substantially equal to its transverse dimension rearward of the recess;

a force transferring member having an inner portion adapted for placement within said recess for engaging said propeller shaft, and having an outer portion projecting beyond the outer surface of said propeller shaft;

bearing collar means engageable with the outer portion of said force transferring member for transferring the axial forward and rearward forces on said propeller shaft;

forward and rearward bearing means engageable with said bearing collar means for transferring forward and rearward forces from said bearing collar means; and

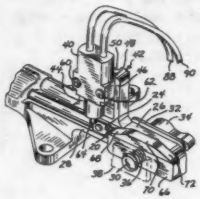
retainer means engaged with said forward and rearward bearing means and said housing for transferring forward and rearward forces from said forward and rearward bearing means to said housing.

4,986,776

MARINE SHIFT SPEED EQUALIZER

Robert J. Hensel, Oshkosh, and Richard E. Staerzl, Fond du Lac, both of Wis., assignors to Burnswick Corporation, Skokie, Ill.

Filed Jun. 20, 1989, Ser. No. 368,770
Int. Cl.[5] B63H 5/06
U.S. Cl. 440—87 19 Claims



1. A method of providing shift speed equalization when shifting a marine transmission in a marine drive subject to a decrease in engine speed upon shifting said transmission from neutral to a forward or reverse gear, and subject to an increase in engine speed upon shifting back to neutral, comprising:

sensing a given shift condition indicating a given transmission shifting operation from neutral to one of said forward and reverse gears;

increasing engine speed in response to said given shift condition to compensate said decrease in engine speed due to said shifting;

sensing a return shift condition indicating a return transmission shifting operation back to neutral;

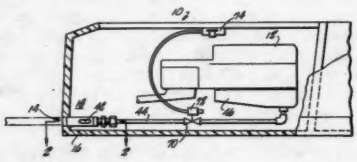
decreasing engine speed in response to said return shift condition to compensate said increase in engine speed due to said shifting.

4,986,777

MARINE ENGINE OIL DRAINAGE DEVICE

Donald G. Preston, 1318 Hermana Ct., Vista, Calif. 92084

Continuation-in-part of Ser. No. 266,015, Nov. 2, 1988, abandoned. This application Oct. 27, 1989, Ser. No. 427,719
Int. Cl.[5] B63H 21/10
U.S. Cl. 440—88 19 Claims



1. A marine drainage device comprising a hollow casing having a casing wall which defines a casing exterior and a casing interior, wherein:

(a) the casing comprises an open-ended tubular discharge section whose open end provides a first casing opening;

(b) the casing wall defines a second casing opening for allowing the flow of fluids from the casing exterior to the casing interior;

(c) the casing wall defines a third casing opening;

(d) the casing comprises first connection means for connecting the casing with a first conduit which communicates with the casing exterior, such connection being accomplished within the third casing opening in such a way that fluids within the casing interior are prevented from flowing around the first conduit through the third casing opening to the casing exterior; and

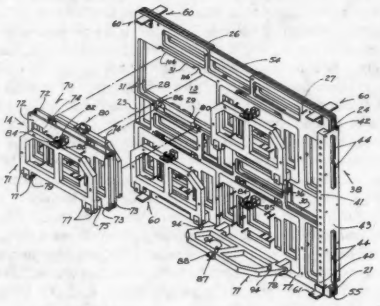
(e) the casing comprises second connection means for connecting the first conduit into fluid communication with a second conduit which is protruded into the casing interior via the first casing opening, such connection being accomplished within the casing interior and in such a way that fluid within the first conduit can flow out of the casing interior via the second conduit but cannot flow out of the casing interior through the second casing opening.

4,986,778

CARRIER FOR USE IN TESTING CIRCUIT BOARDS

Peter A. Liken, West Olive, and Steven B. Ensing, Holland, both of Mich., assignors to 501 Venturdyne, Ltd., West Allis, Wis.

Filed May 4, 1989, Ser. No. 347,468
Int. Cl.[5] H01R 9/09; H05K 7/10
U.S. Cl. 439—74 25 Claims



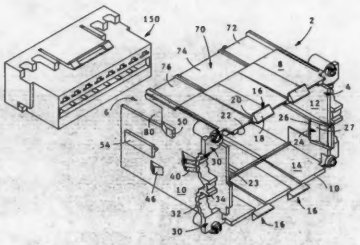
1. A carrier for use in testing circuit boards includes a frame assembly and a plurality of circuit board mounting modules separable from the frame assembly, a plurality of module receiving means formed in said frame assembly and including means for individually receiving each of said modules, each of said module receiving means being identically constructed and arranged, said modules each being constructed and arranged complementary to the module receiving means whereby said modules may be interchangeably mounted in any of said module receiving means, securing means for securing said modules in said module receiving means, said modules each including retaining means for retaining individual circuit boards, and electrical connector means for connecting said circuit boards to a source of electrical energy and control signals exterior of said carrier assembly, said electrical connector means including a first electrical connector assembly mounted on the frame assembly for being connected to an external source of electrical energy, a plurality of identical second electrical connector assemblies each being in circuit with the first electrical connector assembly and one being located adjacent each of said module receiving means and a third electrical connector assembly mounted on each of the modules and each being adapted to be connected to any one of the second electrical connector assemblies, and contact means mounted on each module and dedicated to the specific circuitry of a circuit board to be mounted thereon, whereby circuit boards having different circuit designs can be mounted on different dedicated modules which may be received on any one of said module receiving means, and whereby said electrical connector means permits all of the circuit boards of different designs to be connected to an external source of energy or control signals so that the same carrier can be used for testing circuit boards of different designs.

4,986,779

LOCAL AREA NETWORK INTERFACE

Jess B. Ferrill, Madison, and Randy G. Simmons, Clemmons, both of N.C., assignors to AMP Incorporated, Harrisburg, Pa.

Filed Feb. 6, 1990, Ser. No. 475,620
Int. Cl.[5] H01R 4/66
U.S. Cl. 439—108 7 Claims



1. A local area network outlet receptacle assembly comprising:

an outlet means having at least one open compartment for receiving therein a connector for the network, the outlet means being a metallic plated dielectric material having integral latching means having a latching surface facing in a first direction, and an integral and at least one flexible plated grounding arm having a grounding surface which faces in the opposite direction as the first direction, whereby;

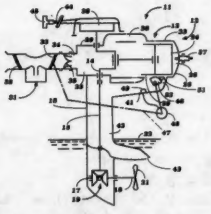
when the outlet means is located in a panel through hole, the panel is trapped between the latching surface and the grounding surface, and the outlet means is grounded to the panel.

4,986,780

TWO CYCLE ENGINE

Masafumi Sougawa, Hamamatsu, Japan, assignor to Sanshin Kogyo Kabushiki Kaisha, Hamamutsu, Japan

Filed Sep. 6, 1988, Ser. No. 240,924
Claims priority, application Japan, Sep. 4, 1987, 62-222651
Int. Cl.[5] B63H 21/32
U.S. Cl. 440—89 15 Claims



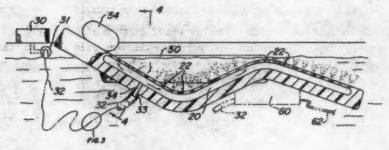
1. An outboard motor comprising a powerhead including a two cycle, crankcase compression, internal combustion engine driving a crankshaft, a lower unit depending from said powerhead and carrying propulsion means driven by said crankshaft, said outboard motor comprising an exhaust port in said engine for receiving exhaust gases and discharging them, an exhaust system extending from said exhaust port through said lower unit and terminating in an underwater exhaust gas outlet for discharging exhaust gases from the engine to the atmosphere through the body of water in which said outboard motor is operating, the degree of submersion of said exhaust gas outlet depending upon the speed of travel of said outboard motor through the body of water, an exhaust control valve in said exhaust system for controlling the flow of exhaust gases therethrough, and means for regulating the position of said exhaust control valve in response to the position of a throttle in the induction system of the engine.

4,986,781

FLOATING LOUNGE

Frederick C. Smith, R.R. 2, Box. 296A, Perkasie, Pa. 18944

Filed Jul. 11, 1988, Ser. No. 217,216
Int. Cl.[5] E04H 3/18
U.S. Cl. 441—130 5 Claims



4. A floating lounge comprising a lounge body constructed to support a person in a reclined position including

a back portion of a size to support the back of a person supported on the lounge body and a seat portion of a size to support the outstretched legs of a person supported on the lounge body,

said lounge body defining an enclosed chamber therein providing a fluid distribution chamber, said chamber extending throughout a substantial extent of said back portion and said seat portion of said lounge body,

said lounge body having a plurality of orifices providing flow communication from said flow distribution chamber to the top surface thereof on which the person is supported,

said orifices being distributed throughout the lounge body and being constructed and arranged to deliver small jets of fluid from the flow distribution chamber onto a person supported on the lounge body to provide a massage-like action,

means for supplying fluid under an elevated pressure to said flow distribution chamber to cause the fluid to be dispensed through said orifices onto a person supported on the top surface of the lounge body,

float means on said lounge body to provide sufficient buoyancy thereto so that the lounge body will float in water with a person supported thereon in a reclined position,

said fluid supply means including a flexible hose and passage means for providing flow communication between the downstream end of said hose and the interior of said flow distribution chamber,

an air pumping means connected to the upstream end of said hose for delivering air under pressure thereto,

said hose including an injector means for entraining water into the air flowing through said hose, and

valve means for controlling the flow of water to said injector means.

4,986,782

LIQUID FLOW DETECTOR SYSTEM

Lyndon W. Severtson, R.R. 2, Box 120, Hills, Minn. 56138

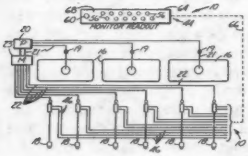
Filed Nov. 24, 1989, Ser. No. 440,721
Int. Cl.[5] B67D 5/38
U.S. Cl. 239—74 7 Claims

1. In an apparatus for moving a liquid with some electrical conductivity from a supply of such liquid simultaneously through a plurality of feeder conduits and out through a plurality of downwardly open nozzles; a liquid flow detector system for detecting and indicating to an operator of the apparatus, individually as to each of the nozzles, the absence of flow through that nozzle, wherein:

(a) a primary feeder tube forms a part of each feeder conduit, each primary feeder tube having at least one point of minimum cross-sectional area along its length and having an outlet portion situated vertically higher than the nozzle;

(b) a secondary feeder tube forms a part of each feeder conduit, each secondary feeder tube being open between the outlet portion of one of the primary feeder tubes and an upper inlet portion of its nozzle, each secondary feeder tube having an inner cross-sectional area throughout its length of substantially uniform dimension greater than the minimum inner cross-sectional area of its primary feeder tube, and each secondary feeder tube extending from the outlet portion of its primary feeder tube generally downwardly toward its nozzle;

(c) each feeder conduit is so configured as to form an upwardly extending feeder conduit loop, the primary feeder tube forming a substantial part of an upward run of that loop, the secondary feeder tube forming a substantial part of a downward run of that loop, the primary and secondary feeder tubes being joined to each other near the top of the loop;



(d) a pair of adjacent, spaced-apart flow detector electrodes extend through an upper portion of each secondary feeder tube in position near the top of the feeder conduit loop and on the downward run of the loop, each electrode being electrically insulated from the other, and each terminating in adjacent relation to an opposite lowermost portion of the secondary feeder tube;

(e) a separate indicating means for each conduit is positioned to be readily discernible by an operator of the apparatus; and

(f) electrical means is provided for monitoring the flow of electrons between each of pair of flow detector electrodes, said electrical means being operative upon cessation of electron flow between any pair of electrodes, to trigger the indicating means associated with that conduit.

4,986,783

OUTBOARD MOTOR POWER TAKEOFF

Oswald Brown, P.O. Box 127, 14 Parkwood Dr., Hare Bay, Bonavista Newfoundland, A0G 2P0, Canada A0G 2P0

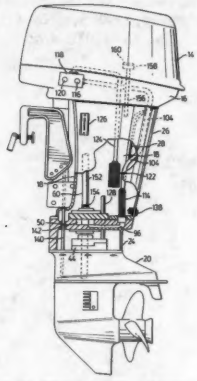
Filed Mar. 2, 1989, Ser. No. 317,926

Int. Cl.[5] B63H *21/38*

U.S. Cl. 440—900 **12 Claims**

10. In an outboard motor assembly of the type having an exhaust leg which has an exhaust compartment through which exhaust fumes are exhausted from the motor and a second compartment which is separated from the exhaust compartment by a divider wall and through which a main drive shaft extends to a propeller shaft, the improvement comprising;

(a) an auxiliary hydraulic pump located within said second compartment, said auxiliary hydraulic pump being connected to the main drive shaft so as to be operable to pump hydraulic fluid when the motor is running said auxiliary hydraulic pump supplying hydraulic fluid to a power takeoff for use outside the motor.



4,986,784

WATER SPORT DEVICE AND ASSOCIATED SAFETY ANCHORING SYSTEM

Phillip B. French, 7805 Mears Rd., Auburn, Calif. 95603

Filed Jul. 12, 1989, Ser. No. 379,607

Int. Cl.[5] A63C *15/00*

U.S. Cl. 441—65 **19 Claims**

1. A water sport device employed by a user for riding on the surface of flowing water, comprising:

(a) a water skimming device;

(b) a flexible safety rod having first and second ends, wherein said first flexible safety rod end is connected to said water skimming device;

(c) flotation means associated with said water skimming device and said flexible safety rod;

(d) a tether having first and second ends, wherein said first tether end is continuous with said second flexible safety rod end whereby said safety rod keeps said tether at a distance from said user to aid in preventing said user's entanglement in said tether; and

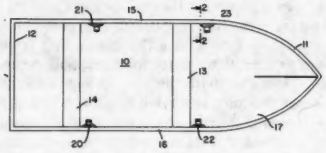
(e) an elongated resilient member having first and second ends, wherein said first resilient member end is connected to said second tether end and said second resilient member end is adapted for fastening to an object that serves as an anchor.

4,986,785

LIFELINE STRAP APPARATUS

Nyal K. Flowers, P.O. Box 14, Bridgeton, N.C. 28515

Filed Nov. 27, 1989, Ser. No. 441,294
Int. Cl.[5] B63C 9/26
U.S. Cl. 441—084 11 Claims



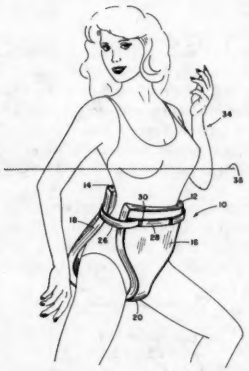
1. Lifeline strap apparatus for use with a capsized or partially submerged boat, comprising a strap of a length to pass laterally over the bottom or top of the boat and provide a loop to encircle the body of a person in the water, means for securing one end of the strap along the side of the boat, means at the other end of the strap to form an adjustable loop for encircling the body of the person, and for adjusting the distance of the person to the boat to obtain a lifting force by the boat through the strap to the person, and means for holding the strap in coiled position, said means being releasable in order to free the strap so that the loop may be tossed across the boat for use by a person on the other side of the boat.

4,986,786

GARMENT FOR USE IN WATER RECREATION

Dewey E. Helt, and Johnann Helt, both of 4321 E. 74th Pl., Tulsa, Okla. 74136

Filed Sep. 1, 1989, Ser. No. 401,793
Int. Cl.[5] B63C 9/08
U.S. Cl. 441—120 3 Claims



1. A garment for use in water recreation comprising:

a unitary flat member of generally non-symmetrical Figure 8 configuration having opposed first and second ends and having a first or front portion having said first end and a second or back portion having said second end, the portions being connected by a narrow or crotch portion, the member being of soft, flexible and floatable material, the back portion being of substantially greater area and volume than the front portion; and

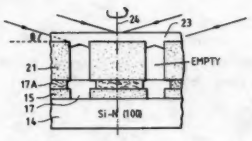
fastening means affixed to said front and back portions adjacent said first and second ends, said member being wearable by a user in which the crotch portion is positioned between the legs of the user and with said front portion in contact with the user's abdomen and said back portion in contact with the user's buttock and lower back, and retainable in said position by said fastening means and whereby the member when worn by a user serves to float the user in a generally upright or seated position.

4,986,787

METHOD OF MAKING AN INTEGRATED COMPONENT OF THE COLD CATHODE TYPE

Jean Olivier, Les Ulis, and Didier Pribat, Paris, both of France, assignors to Thomson-CSF, Puteaux, France

Filed Sep. 22, 1989, Ser. No. 410,850
Claims priority, application France, Sep. 23, 1988, 88 12470
Int. Cl.[5] H01J 40/12, 19/24
U.S. Cl. 445—24 25 Claims



1. A method for fabricating a component of the cold cathode type formed on a substrate made of a semiconducting material capable of being brought to a state of negative electron affinity, implemented for a silicon substrate, said method consisting in:

oxidizing one face of an at least partially monocrystalline, n type silicon substrate;

etching at least one aperture in the silica of this face;

depositing p type silicon on the silica and on the bared parts of the substrate so as to have a surface that is really plane after deposition, said silicon being monocrystalline in the apertures and polycrystalline on the silica;

depositing a layer of dielectric material;

etching, in this latter layer, apertures that are substantially in the axis of the above-mentioned apertures until the layer of p type silicon is reached;

performing an in situ cleaning of the bared surfaces of the p type silicon layer;

doing a treatment that brings the cleaned surfaces to a state of negative electron affinity;

evaporating a layer of anode material under high vacuum and at grazing incidence, with the substrate undergoing a rotational motion on an axis perpendicular to the surface of this substrate, until the sealing of the microcavity thus made.

4,986,788

PROCESS OF FORMING AN IMPREGNATED CATHODE

Jongin Jung Kyungi, Rep. of Korea, assignor to Samsung Electron Devices Co., Ltd., Kyungki, Rep. of Korea

Filed Nov. 2, 1989, Ser. No. 431,381
Int. Cl.[5] H01J 9/04
U.S. Cl. 445—50 6 Claims

1. A method of manufacturing a cathode for an electron tube, comprising the steps of:

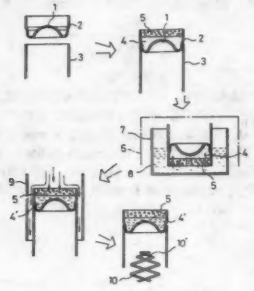
filling a reducing agent into a metal cup having an open top such that 10 to 100% of the volume of said cup is filled with said reducing agent;

sealing said cup at the top with a layer of porous metal to form thereby an electrode;

melting an impregnation compound;

passing the impregnation compound through pores of said porous metal layer into said cup to cause thereby said

impregnation compound and reducing agent to react with each other; and



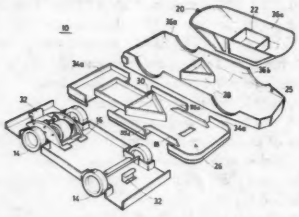
injecting an inert gas through the pores of said porous metal layer to remove compound in said pores.

4,986,789

SHAPE IDENTIFICATION TOY VEHICLE ASSEMBLY

Hoi L. R. Hang, 913 King's Road, 6th Floor, North Point, Hong Kong

Filed Jul. 20, 1989, Ser. No. 382,132
Claims priority, application United Kingdom, Jul. 21, 1988, 8817388
Int. Cl.[5] A63H *17/00, 33/04, 33/08, 17/26*
U.S. Cl. 446—93 10 Claims



1. A shape identification toy having at least three separable interfitting component parts stackable one on top of the other in a predetermined sequence and orientation the toy comprising:

a first component means including a first elongated component having an outer perimeter configuration in the form of a base of a toy vehicle and including a portion intended to movably engage a playing surface, the first component means including an upper face having interfitting connectable means of a first predetermined shape for removably receiving a second component means on the upper face of the first component means;

a second component means, including at least one second elongated component having an outer perimeter configuration in the form of a portion of a body of the toy vehicle, the at least one second elongated component of the second component means including a lower face having interfitting connectable means of a predetermined shape for removably receiving the connectable means of the first elongated component of the first component means at time when the second component means is stacked on the first component means in a predetermined orientation with the lower face of the at least one second elongated component of the second component means opposing the upper face of the first elongated component of the first component means, the at least one second elongated component having an upper face with an interfitting connectable means of a second identifiable shape different from the first predetermined shape for removably receiving a third component means having an interfitting connectable means corresponding to the second identifiable shape;

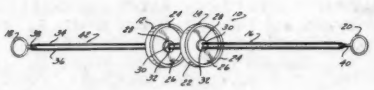
a third component means, including a third elongated component having an outer perimeter configuration in the form of a roof portion of the toy vehicle, the third component means including the third elongated component having a lower face with a first interfitting connectable means of an identifiable shape for removably receiving the connectable means with the second identifiable shape at times when the third elongated member of the third component means is stacked on the second component means in a predetermined orientation with the lower face of the elongated component of the third component means opposing the upper face of the at least one elongated component of the second component means, the first, second and third component means forming a complete integral toy vehicle when stacked one on top of the other in said predetermined orientation.

4,986,790

ROTATABLE DISK STRING TOY

Bradley J. Boury, 20430 Kemp, Mount Clemens, Mich. 48043

Filed Mar. 12, 1990, Ser. No. 492,104
Int. Cl.[5] A63H *1/32, 1/06, 33/22*
U.S. Cl. 446—253 7 Claims



1. A toy comprising:

first and second disks;

first and second bores formed in each of the first and second disks and extending therethrough;

a continuous loop of string extending through the first and second bores in the first and second disks and outward of the first and second disks to outer ends;

first and second means for holding the outer ends of the loop of string, each of the first and second holding means comprising:

a first ring having a central finger engaging aperture and a second ring fixed attached to and extending away from the first ring, the second ring having a central aperture for slidably receiving the loop of string therethrough.

4,986,791

PUPPET

Albert Alfaro, 3750 Richard La., Wantaugh, N.Y. 11793

Filed Jan. 17, 1990, Ser. No. 466,196
Int. Cl.[5] A63H *3/20*
U.S. Cl. 446—361 7 Claims

1. A puppet comprising:

a body;

a head disposed above said body;

flexible spine means for connecting a back of the head to a back of the body;

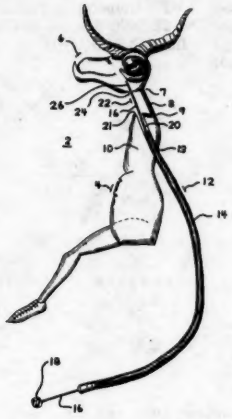
a cable assembly means, forward of said spine means, for supporting and actuating the head in vertical and horizontal motion said means comprising:

a sheath; and

a flexible yet stiff cable within said sheath;

the sheath being fixedly embedded in a torso of the body; and

the cable passing through the sheath, out the top of the body, and secured fixedly to the underside of the head in an area



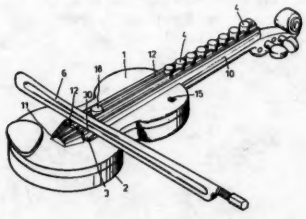
corresponding to a neck of the puppet, said cable extending out from a distal end of the sheath.

4,986,792

VIOLIN MUSICAL TOY

Chen-Hsiung Chen, No. 209-2, Chien Kang Road, Tainan, Taiwan

Filed Jan. 29, 1990, Ser. No. 471,447
Int. Cl.[5] A63H *3/52, 5/00, 3/28*
U.S. Cl. 446—408 **4 Claims**



1. A violin musical toy comprising:

a cover having a bulgy portion at its front and a bridge at its rear end and several string plates integral with a top surface and a hole in-between said bulgy portion and said bridge, said bulgy portion has several key holes, a song selection switch, a function selecting switch and several posts;

a body having a groove, a mounting aligned with said hole of said cover, a speaker at one side of said groove and a keyboard placed at the front end of said body, said body having several control points on said keyboard, each control point being aligned with one of said keyholes;

an engaging member placed in-between said mounting of said body and said bridge of said cover said engaging member having several string-simulating plates on top, two protuberances at two bottom ends and two axles at two sides;

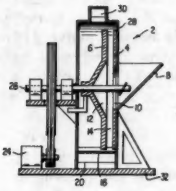
several keys, each key having a hollow portion at its inside halfway from bottom to top and each accommodating a block which has half of its top inserted into said hollow portion and which has an electric rubber conductor at its center bottom and an elastic portion at its bottom portion; thus when drawing a bow on said string-simulating plates, said engaging member will incline to either of two sides and one of said two protuberances will press one copper plate down to touch another copper plate and trigger a control circuit to output a preset musical selection if said selecting switch is placed at an 'AUTO' position or to output different tones when different keys are pressed when said selecting switch is placed at a 'MANUAL' position.

4,986,793

SEED CORN SHELLER

Zenas A. Stanfield, 106 S. Vale St., Bloomington, Ill. 61701

Filed Jan. 10, 1989, Ser. No. 295,280
Int. Cl.[5] A01F *11/06*
U.S. Cl. 460—47 **6 Claims**



1. A seed corn sheller comprising:

fixed plate means for receiving ears of corn through a substantially central portion thereof;

rotating plate means spaced from said fixed plate means for holding and removing kernels from the ears of corn against said fixed plate means, said rotating plate means comprising conical means in a central portion thereof for receiving said ears of corn; and

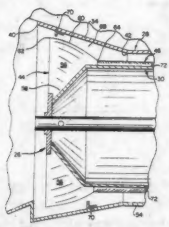
feeding means for adding ears of corn between said fixed plate means and said rotating plate means through the substantially central portion of said fixed plate means into said conical means.

4,986,794

ROTOR ASSEMBLY FOR AN AXIAL-FLOW COMBINE

Jonathan E. Ricketts, Viola, Ill., assignor to J. I. Case Company, Racine, Wis.

Filed Apr. 3, 1990, Ser. No. 503,748
Int. Cl.[5] A01F *7/06, 12/18, 12/20*
U.S. Cl. 460—67 **3 Claims**



1. An improved rotor assembly for an axial-flow combine comprising:

an elongated generally cylindrical rotor casing extending in a fore-and-aft direction on the combine, said rotor casing defining a frusto-conically shaped transition section designed for endwise reception of crop material and config-

ured with a decreasing cross-sectional area in a downstream direction extending from a forward end to an aft end, with the aft end of said transition section leading to a threshing region and a separating region defined by said rotor casing; and

a rotor mounted for rotation in the rotor casing about an axis of rotation, said rotor including an impeller section which leads in a downstream direction to a threshing section, said impeller section being defined by a plurality of impeller blades arranged within the transition section of said rotor casing and with each impeller blade having a working edge with a declining slope extending between leading and trailing ends on each blade to create in cooperation with the transition section on the rotor casing an annular opening through which crop material moves toward the threshing section and wherein the trailing end of each impeller blade terminates upstream of the aft end of the transition section such that the annular opening through which crop material moves increases rearwardly of the trailing ends of the impeller blades, said threshing section of said rotor including a plurality of peripherally arranged rasp bars for combing and rearwardly propelling the crop material presented thereto by the impeller blades, a forward end of each rasp bar extending upstream of the aft end of the transition section on the rotor casing and adjacent to the trailing end portion of the impeller blades to begin a threshing action on the crop material in the transition section of the rotor casing and thereby facilitating crop material flow rearwardly through the rotor assembly.

4,986,795

METHOD AND APPARATUS FOR GUIDANCE AND ACTUATION OF FLAT BELT DRIVE UNDER EXTERNAL LOAD

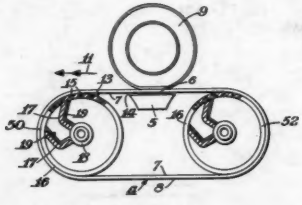
Karlheinz Storck, Muhltal, Fed. Rep. of Germany, assignor to Carl Schenck AG, Fed. Rep. of Germany

Division of Ser. No. 329,943, Mar. 29, 1989, Pat. No. 4,944,714. This application May 31, 1990, Ser. No. 531,256

Claims priority, application European Pat. Off., Apr. 22, 1988, 88106487.7

Int. Cl.[5] F16H *57/04*

U.S. Cl. 474—91 **7 Claims**



1. Apparatus for guiding and moving a belt comprising a drive roller, an idler roller, and a flat belt trained around the rollers, the flat belt having an outer load bearing surface and an inner surface wetted with liquid to assist in supporting a load and to reduce friction, and each of the rollers having a smooth exterior surface and a hollow interior, drainage openings in the roller extending from the exterior surface thereof to the hollow interior, and stationary wiper elements within the hollow roller interior for collecting and removing liquid that drains through the drainage openings.

4,986,796

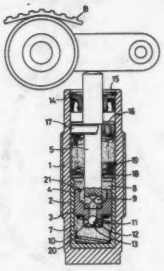
HYDRAULIC AUTOTENSIONER

Kazuki Kawashima, and Hisashi Hayakawa, both of Iwata, Japan, assignors to NTN Corporation, Osaka, Japan

Filed Feb. 27, 1990, Ser. No. 485,664

Int. Cl.[5] F16H *7/08*

U.S. Cl. 474—101 **1 Claim**



1. An autotensioner filled with a hydraulic oil containing poly-α-olefin as a basic ingredient.

4,986,797

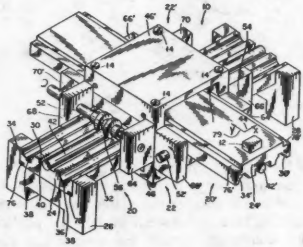
XY POSITIONING APPARATUS

Robert Nemirovsky, 117 Hyman Ave., Bay Shore, N.Y. 11706, assignor to Robert Nemirovsky, Bay Shore and Joseph Deutsch, Commack, both of, N.Y.

Continuation-in-part of Ser. No. 333,134, Apr. 3, 1989, Pat. No. 4,923,434. This application Mar. 14, 1990, Ser. No. 493,284

Int. Cl.[5] F16H *7/00*

U.S. Cl. 474—101 **20 Claims**



1. A positioning apparatus comprising:

a. track means including a rail extending in a preselected direction said track means having first and second surfaces; and

b. carriage means having a rotatable pulley in frictional engagement with said rail along said first surface to move said carriage when said pulley is rotated, and said carriage further having first and second bearing means for engaging said second surface, said first and second bearing means being spaced along an axis perpendicular to said rail;

whereby an object disposed on one of said track means and said carriage means is positioned in said preselected direction by rotating said pulley.

4,986,798

TRANSMISSION CHAIN WITH PIVOT PINS AND INTERMEDIATE PIECES WITH ROLLING CONTACT ACTION

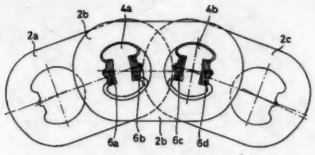
Jacobus H. M. Van Rooij, Nuenen, and Theodorus P. M. Cadee, Asten, both of Netherlands, assignors to Volvo Car B.V., Helmond, Netherlands

Filed Oct. 5, 1989, Ser. No. 417,518

Claims priority, application Netherlands, Oct. 7, 1988, 8802467

Int. Cl.[5] F16G *13/06*

U.S. Cl. 474—214 6 Claims



1. Transmission chain for a cone pulley drive, comprising a number of intercoupled links each accommodating two pivot pins which lie at right angles to the link plane and are inserted through link openings, and the end surfaces of which cooperate as friction faces with the cone surfaces, and whose longitudinal sides constitute rolling surfaces with a radius of curvature different from that of the rolling surface cooperating therewith, and where between each pivot pin, on the one hand, and the opposite-lying upright opening sides of a number of adjacent links, on the other, an intermediate piece with rolling contact action is inserted whose first longitudinal side is coupled to the link opening side, and of which the opposite-lying second longitudinal surface forms the rolling contact surface cooperating with the longitudinal side of the pin, a number of grooves running between the first and the second longitudinal side being provided in each intermediate piece in at least the narrow longitudinal side facing the inside of the chain, said grooves widen in the direction of the second longitudinal side.

4,986,799

TRANSMISSION CHAIN WITH PIVOT PINS AND INTERMEDIATE PIECES WITH ROLLING CONTACT ACTION

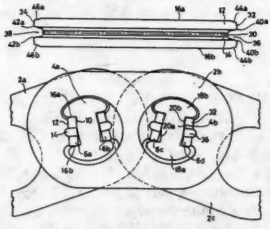
Hermanus A. C. Holweg, Rosmalen, Netherlands, assignor to Volvo Car B.V., Helmond, Netherlands

Filed Oct. 5, 1989, Ser. No. 417,519

Claims priority, application Netherlands, Oct. 7, 1988, 8802468

Int. Cl.[5] F16G *1/24*

U.S. Cl. 474—240 6 Claims



1. A transmission chain for a cone pulley drive comprising a plurality of intercoupled links (*2a . . 2c*) each having two openings therein and each said opening having an edge surface, two pivot pins (*4a, 4b*) disposed through said openings respectively of a link at right angles to the plane of the link, each said pivot pin having end faces (*18a, 18b*) which cooperate as friction surfaces with cone surfaces of cone pulleys, each said pivot pin having opposed longitudinal sides (*20a, 21b*) and each said longitudinal side having a radius of curvature, a plurality of intermediate pieces (*6a . . . 6d*) and a said intermediate piece disposed between each pivot pin and a link opening edge surface opposed from said pivot pin such that each said intermediate piece has rolling contact action with a said longitudinal side of a said pivot pin, each said intermediate piece having opposed ends (**32,34**) and there being a first longitudinal side (**12**) and an opposed second longitudinal side (**10**) extending between said ends, there being a central longitudinally extending rib (**14**) on said first longitudinal side to couple said intermediate piece to the link opening edge surface, said rib extending longitudinally from one of said opposed ends to the other, there being a recess (**36,38**) in each of said ends of a said intermediate piece disposed at right angles to a central longitudinal axis (**30**) of said intermediate piece, each said recess extending between said first and second longitudinal sides and through said rib.

4,986,800

FOUR-WHEEL LOCKING SYSTEM FOR A MOTOR VEHICLE

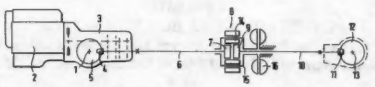
Peter Meffert; Heinrich Schwarz, both of Tiefenbronn, and Juergen Patzer, Neckartailfingen, all of Fed. Rep. of Germany, assignors to Dr. Ing. h.c.F. Porsche AG

Filed Jun. 8, 1989, Ser. No. 363,143

Claims priority, application Fed. Rep. of Germany, Jun. 9, 1988, 3819703

Int. Cl.[5] F16H *3/44*

U.S. Cl. 475—113 5 Claims



1. A four-wheel locking system in the drive line of a motor vehicle comprising:

a planetary transmisson formed by an input sun gear driven by a motor vehicle transmission and an output sun gear which is disposed coaxially next to the input sun gear and connected with an axle to be driven and having a slightly larger number of teeth than the input sun gear, the planetary transmission further including planet wheels of a planet carrier which mate with the input and output sun gears; and

braking means effecting a locking of rotational movement of the planet carrier, wherein a real pitch module of all gear wheels of the planetary transmission is proportional to a driving torque to be transmitted and is dimensioned to be between approximately 1.0 mm and 4.0 mm, and wherein an operational pressure angle is about 14° to 31°.

4,986,801

DEVICE FOR A RELATIVE ANGULAR ADJUSTMENT BETWEEN TWO SHAFTS CONNECTED TO ONE ANOTHER BY DRIVING MEANS

Rolf Ohlendorf, Weinstadt; Willy Treyz, Neckartailfingen, and Wolfgang Speier, Tübingen, all of Fed. Rep. of Germany, assignors to Daimler-Benz AG, Fed. Rep. of Germany

Filed Sep. 6, 1989, Ser. No. 403,381

Claims priority, application Fed. Rep. of Germany, Sep. 7, 1988, 3830382

Int. Cl.[5] F16H *1/32*

U.S. Cl. 475—331 12 Claims

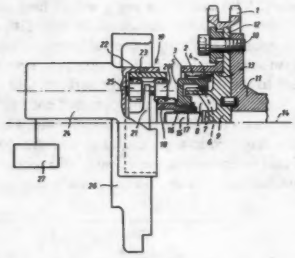
1. A device for a relative angular adjustment between two shafts drivingly connected to one another;

one shaft carries an actuating element at its end, which actuating element is axially shiftable on this end and is connected positively to the end via a helical gear teeth set;

said actuating element is connected to a cylindrical hollow

shaft surrounding the actuating element in an axially shiftably and positive driven manner by a further helical gear test set;

the cylindrical hollow shaft carries a driving wheel connected to the other shaft;



the actuating element is freely rotatably and axially fixed to a carrier connected to the one shaft via a clamping thread; and wherein

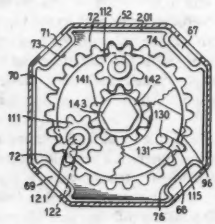
the carrier is connected to the one shaft rotatably driven by an electric motor via a transmission means.

4,986,802

PLANETARY GEAR BOX FOR A JACK

John R. Scoville, Butler, and Darryl L. Engel, LaOtto, both of Ind., assignors to Universal Tool & Stamping Co., Inc., Butler, Ind.

Filed Jun. 5, 1989, Ser. No. 361,427
Int. Cl.[5] F16H *3/70, 57/02*
U.S. Cl. 475—346 **3 Claims**



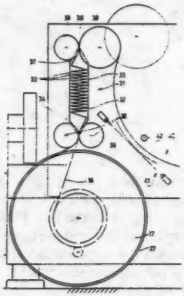
1. A planetary gear box for a jack comprising, a hollow housing, a ring gear loosely mounted in said hollow housing so that said ring gear can move relative to said housing but is restrained from rotating relative to said housing, a planet gear carrier mounted in said hollow housing, a plurality of planet gears rotatably supported by said planet gear carrier and said planet gears in mesh with relative to said housing and non-rotatably attached to said sun gear, and a second shaft extending into said hollow housing and rotatably mounted relative to said housing and non-rotatably attached to said planet gear carrier, wherein said ring gear is formed with at least one notch and said hollow housing is formed with at least one extension which fits into said notch, wherein said hollow housing is formed of a first and second stamped members which are joined at their outer edges by bending said first member over the second member to lock said first and second members together, and wherein said ring gear is a stamped member and is generally square shaped with truncated corners in which said notches are formed.

4,986,803

APPARATUS FOR THE PRODUCTION OF CIGARETTE PACKS

Heinz Focke, and Kurt Liedtke, both of Verden, Fed. Rep. of Germany, assignors to Focke & Co. (GmbH & Co), Verden, Fed. Rep. of Germany

Continuation of Ser. No. 261,042, Oct. 21, 1988, Pat. No. 4,943,271. This application Jan. 24, 1990, Ser. No. 469,896
The portion of the term of this patent subsequent to Jul. 24, 2007, has been disclaimed.
Int. Cl.[5] B31B *1/16, 3/36, 45/101*
U.S. Cl. 493—24 **5 Claims**



1. In an apparatus for producing hinge-lid cigarette packs from a continuous web of material formed of semirigid blanks connected to one another via flexible residual connections and moving in a conveying direction including severing means for severing the blanks from the web and folding units for forming the packs from the blanks, the improvement comprising:

a web store (31) for storing the web including a upright extending storage container (33) having a lower, entrance end with a funnel-shaped run-in piece (34) which widens in the conveying direction and which has an entrance slit (35) for receiving the web and having an upper, exit end with a funnel-shaped run-out piece (37) which narrows in the conveying direction and which has an exit slit (38) through which the web exits;

further comprising a pair of push rollers (36) located immediately upstream of said entrance slit (35) of said storage container (33) for feeding the web into said entrance slit and a pair of draw rollers (39) located immediately downstream of said exit slit (38) of said storage container (33) for drawing the web out of said exit slit, and

wherein said web of material (16) passes through said storage container (33) from the lower, entrance end to the upper, exit end, the zig-zag folding being formed in the lower, entrance end and the web of material (16) being straightened in the upper, exit end of said storage container.

4,986,804

METHOD FOR FORMING ANGULAR SEALS IN SIDE-GUSSETTED BAGS

Harold A. Jensen, Brockton, Mass., assignor to Katana Corporation, Somerville, Mass.

Division of Ser. No. 184,077, Apr. 15, 1988, Pat. No. 4,895,556, which is a continuation-in-part of Ser. No. 34,898, Apr. 3, 1987, abandoned. This application Nov. 8, 1989, Ser. No. 434,094
Int. Cl.[5] B31B *1/64, 37/64*
U.S. Cl. 493—193 **10 Claims**

1. A method for sealing film which includes:

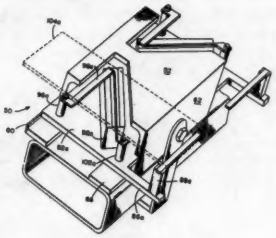
(A) flowing current continuously through a sealing element;

(B) placing a two ply longitudinal film of thermoplastic material into contacting engagement with said element;

(C) moving said film across said element and between a sealing shoe and an electromagnet;

(D) stopping said film;

(E) activating said electromagnet to move the sealing shoe to carry the film into heat transfer relationship with the sealing element to remove the heat from the element to form a seal to join the plies one to the other;



(F) moving subsequently the film across the element; and
(G) repeating steps D-F during performance of step A.

4,986,805

FIREFIGHTER'S PORTABLE WATER RESERVOIR AND METHOD OF MAKING THE SAME

Michael D. Laramore, Santee, Calif., assignor to Baldwin/Green Inc., San Diego, Calif.

Filed Oct. 18, 1989, Ser. No. 423,041
Int. Cl.[5] B31B *39/60, 39/68, 41/26*
U.S. Cl. 493—199 **10 Claims**

1. A method of making a firefighter's portable water reservoir comprising the steps of

providing a first ply of water impervious flexible sheet material highly resistant to delamination, puncture and rupture and capable of being integrally welded to itself such that the weld likewise is highly resistant to delamination and rupture;

providing a second ply of reinforced flexible sheet material having high tear and tensile strength, shape retention, and resistance to heat, flame and hydrostatic pressure;

cutting each of said plys to a configuration comprising a matched pair of layouts of a garment-like body portion conformable to a portion of a firefighter's body, each pair of layouts being of opposite hand and integrally joined together along a center line which defines the bottom boundary of the garment like body portion;

superimposing one ply of material on the other ply of material in mutually aligned relationship;

cutting aligned outlet openings through the two plys of material along their respective center lines;

cutting aligned filler openings through the two plys of material in an area thereof that will comprise an upper outer wall portion of the garment-like body portion;

securing an outlet fitting in the aligned outlet openings in sealed relationship with portions of both plys of material surrounding the respective outlet openings;

securing a fill fitting in the aligned filler openings in sealed relationship with portions of both plys of material surrounding the respective filler openings;

folding the first ply of material upon itself along the center line thereof and aligning the free edges of the two layouts thereof with one another;

welding the free edges of the two layouts of the first ply to one another in a continuous wide weld;

folding the second ply of material along the center line thereof to enclose the first ply within the second ply and aligning the free edges of the two layouts of the second ply with one another and the welded edges of the first ply; and

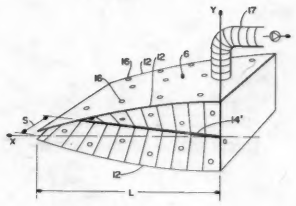
attaching the free edges of both layouts of the second ply to the welded edges of the first ply substantially continuously along and solely within the continuous wide weld.

4,986,806

GUSSET TUBING FORMER

Gilbert Braedle, Ringendorf; Paul Cromer, Stotzheim, and Francis Lück, Rosenwiller, all of France, assignors to H.I. Holweg International, Rosheim, France

Filed Jul. 3, 1989, Ser. No. 375,350
Claims priority, application France, Jul. 5, 1988, 88 09270
Int. Cl.[5] B31B *1/40;* B65H *45/08*
U.S. Cl. 493—468 **9 Claims**



1. A gusseted tubing former for use in a manufacturing line for forming bags from a continuous web, as said web moves along said manufacturing line, for forming said continuous web, into a flattened gusseted tubular shape, said former comprising:

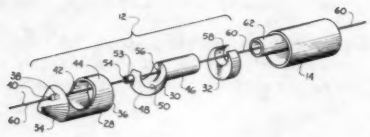
a unitary body around which said web is formed into a tubing as said web is moved along said manufacturing line, said unitary body having (a) a predetermined length and being adapted to extend lengthwise along said manufacturing line, (b) a predetermined width transverse to said manufacturing line, and (c) an outer surface having a transverse profile comprising a generally continuous transverse periphery along said length of said body, said transverse profile being variable along said length of said body about which said continuous web is to be trained, for facilitating formation of lateral gussets in said continuous web said continuous transverse periphery being of generally constant peripheral length along the length of said body and defining a generally open ungusseted tubular shape at an upstream end thereof and a shape at a downstream end thereof corresponding to a transverse section of said flattened gusseted tubular web, said body further comprising means for supplying vacuum to said outer surface to maintain said web against said body.

4,986,807

ATHERECTOMY CUTTER WITH RADIALLY PROJECTING BLADE

Andrew F. Farr, Spring Valley, Calif., assignor to InterVentional Technologies, Inc., San Diego, Calif.

Filed Jan. 23, 1989, Ser. No. 299,147
Int. Cl.[5] A61B 17/32
U.S. Cl. 604—22 11 Claims



1. A device for removing obstructive tissue from a body vessel which comprises:

a rotatable cutter having a blade; and

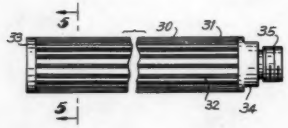
a hollow cylindrical housing defining a cylindrical periphery, said housing being formed with a side opening, said housing supporting said cutter therein to cyclically project said blade from within said housing through said opening beyond said periphery during rotation of said cutter.

4,986,808

MAGNETOSTRICTIVE TRANSDUCER

Alan Broadwin, Brooklyn, N.Y., and Leonard M. Emery, West Haven, Conn., assignors to Valleylab, Inc., Boulder, Colo.

Filed Dec. 20, 1988, Ser. No. 287,748
Int. Cl.[5] A61M 1/00
U.S. Cl. 604—22 5 Claims



1. A magnetostrictive transducer comprising a plurality of elongated strips of magnetostrictive material, each of said strips having a proximal end, a distal end and a substantially V-shaped cross section wherein each arm of the V-shaped cross section is formed by the longitudinal length of each of said strips, each arm of each of said strips being attached along the radial length of each arm to each arm of each adjacent one of said strips only at both the proximal end and the distal end to form an integral substantially rigid column having a central axis with fins extending radially relative to said axis.

4,986,809

PERCUTANEOUS OXYGENATOR

Brack G. Hattler, 5226 Westminster Pl., Pittsburgh, Pa. 15232

Continuation-in-part of Ser. No. 338,581, Apr. 17, 1989, Pat. No. 4,911,689. This application Feb. 26, 1990, Ser. No. 485,299
The portion of the term of this patent subsequent to Mar. 27, 2007, has been disclaimed.
Int. Cl.[5] A61M 37/00
U.S. Cl. 604—26 27 Claims

1. A percutaneous oxygenator comprising:

(a) a tubular connector having a lower opening and an upper portion dividing to form two passageways in fluid communication with said lower opening, both of said passageways having a separate exterior opening; and

(b) a first group of a number of hollow, gas-permeable fibers, each fiber having two ends, the first end of each fiber located in the first passageway of said connector in fluid communication with the exterior opening of said first passageway, said fibers extending downward through said lower opening with the second end of each fiber located a predetermined distance below said lower opening;

(c) a second group of a number of hollow, gas-permeable fibers, each fiber having two ends, the first end of each

fiber located in the second passageway of said connector in fluid communication with the exterior opening of said second passageway, said fibers extending downward through said lower opening with the second end of each fiber located a predetermined distance below said lower opening;

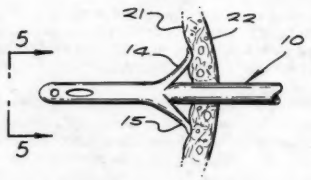
(d) a tip member having an interior cavity in fluid communication with the second ends of said first group of fibers and with the second ends of said second group of fibers.

4,986,810

TOGGLE CATHETER

Neal Semrad, 2180 Cedarhurst Dr., Los Angeles, Calif. 90027

Filed Sep. 1, 1989, Ser. No. 402,487
Int. Cl.[5] A61M 5/32
U.S. Cl. 604—106 7 Claims



1. A catheter comprising:

an elongated hollow member having a distal end region including at least one inlet positioned to allow entrance of body fluids into the interior of the elongated hollow member and an outlet in a proximal end region opposite of said distal end region for draining of body fluids from a body cavity;

said inlet being located in the distal end region of said catheter;

at least one flexible, laterally extendable wind member unitary with and on the exterior of said catheter for retaining the catheter within a body cavity by extension of the wing member against the inner wall of the body cavity;

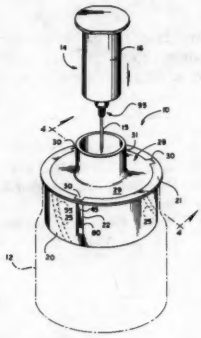
said wing member being attached to said catheter toward the distal end thereof but proximal to said inlet and foldable toward the proximal end thereof upon insertion of the catheter into the body cavity and foldable toward the distal end of said catheter upon withdrawal of the catheter from the body cavity.

4,986,811

APPARATUS AND METHOD FOR SAFELY REMOVING NEEDLES FROM SYRINGES

William H. Thead, and John C. Evans, both of Atlanta, Ga., assignors to Post Medical, Inc., Atlanta, Ga.

Filed Sep. 23, 1988, Ser. No. 248,470
Int. Cl.[5] A61M 5/32
U.S. Cl. 604—110 **20 Claims**



1. An apparatus for removing needles of the type received in syringe bodies by way of a rotating connector, and defining a collar positioned outside said syringe body, comprising:

a needle guide housing defining an insert opening for receiving said needle;

means for movable supporting said needle guide housing; and

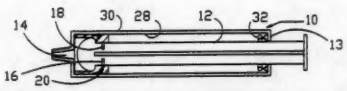
means drivingly linked to said needle guide housing and driven by force exerted on said guide housing parallel to the length of said needle for engaging said collar and rotating said needle when said needle is received in said insert opening, such that said needle is released from said syringe.

4,986,812

LOCKING DEVICE PREVENTING REUSE OF A DISPOSABLE SYRINGE

Robert F. Perler, 25 Lockwood Ave., New Rochelle, N.Y. 10801

Filed Apr. 6, 1989, Ser. No. 334,710
Int. Cl.[5] A61M 5/00
U.S. Cl. 604—110 **21 Claims**



1. A locking device for use in a plastic disposable syringe body with an open end, and fitting around a plunger shaft associated with said syringe body, comprising:

(a) a base, proportioned to fit within said syringe body, said base defining a central opening sufficiently large such that said plunger shaft may pass through said opening;

(b) a syringe prong integrally associated with said base, extending from said base in an axial direction and radially outwardly to an extent that said syringe prong contacts said syringe body when said locking device is positioned in said syringe body; and

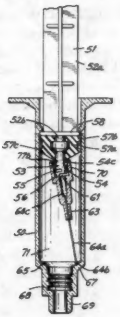
(c) a shaft prong integrally associated with said base, extending from said base in the same axial direction as said syringe prong and extending radially inwardly to an extent that said shaft prong contacts said plunger shaft when said plunger shaft is within said central opening.

4,986,813

DISPOSABLE HYPODERMIC SYRINGE

Joseph W. Blake, III, New Canaan, and Thomas E. Sloane, Jr., West Reading, both of Conn., assignors to The MadTech Group, Inc., South Plainfield, N.J.

Continuation-in-part of Ser. No. 150,621, Feb. 8, 1988, abandoned. This application Jan. 12, 1989, Ser. No. 296,495
Int. Cl.[5] A61M 5/32
U.S. Cl. 604—110 **10 Claims**



1. An article comprising a disposable retractable hypodermic needle & syringe apparatus comprising a hypodermic needle-containing assembly and a syringe assembly to receive said hypodermic needle-containing assembly in an extended mode, prior to use, and in a retracted mode, after use, wherein

(a) said syringe assembly comprises a barrel comprising an elongated cavity, to receive or deliver fluids during use and to receive said needle-containing assembly in its retracted mode, after use thereof, said cavity being surrounded by a wall comprising at its proximal end a large opening, through which a plunger may be passed into said cavity, and at its distal end small opening from which there outwardly extends, coaxially with said cavity, a hollow stem to receive said needle-containing assembly said stem further comprising means to removably interlock with said needle-containing assembly;

(b) a hypodermic needle-containing assembly comprising a hollow needle, comprising a sharp distal end and a proximal end surrounded by a hub comprising, at its outer wall, second means to removably interlock said hub with the interlocking means of said stem prior to and during use and at the inner wall of its proximal end comprising third means to removably interlock said hub with interlocking means of a plunger, to remove said assembly from its interlock with the stem and retract the assembly from said stem into said cavity to prevent reextension of the needle through said stem; and p1 (c) plunger means comprising an elongated member comprising at its proximal and means for being gripped and turned and, at its distal end, a plunger head comprising:

(1) at its distal end a flexible tip comprising:

(i) a notch passing partially through said tip, said notch being approximately normal to the longitudinal axis

of the tip and spaced proximally from the distal end thereof;

(ii) a first, triangular, distally-directed projection on the wall thereof opposite said notch and displaced proximally from said notch which may lockingly engage a cooperating projection on the inner wall of the cavity of the needle-containing assembly wherein the upper portion of said first projection is partially removed to provide a horizontal surface, or shelf, extending partially through side projection, and a side wall rising from said shelf to the upper horizontal surface of the projection; and

(iii) a second projection extending distally from the lower wall of said flexible tip having a curved outer surface; wherein said notch is normally open causing the flexible tip of the plungerhead to be angled relative to the plunger axis and when the tip of the plunger head is in the cavity of the needle assembly the notch is compressed, the tip becomes coaxial with the plunger and the combination of notch and tip form a spring under tension; and

(2) sealing means extending normally outward from the plunger rod and displaced proximally from said flexible tip said means having an outer diameter from about equal to slightly greater than the inner diameter of the barrel to prevent leakage of fluid from the barrel cavity;

(3) piston means extending normally outward from the plunger rod and spaced between the sealing means and the flexible tip said piston means having an outer diameter from about equal to slightly greater than the inner diameter of the barrel to draw fluids into or expel fluids from the barrel cavity; and

(4) stopping means extending normally outward from the plunger rod and spaced proximally from the sealing means, to engage complementary stopping means on the inside of the barrel wall to prevent removal of the plunger and needle-containing assembly from the syringe barrel after retraction of the needle-containing assembly from the barrel stem; wherein the third means on the inside wall of the needle-containing assembly cavity comprise two triangular proximally directed projections on opposite sides of the cavity wall the lower, flat wall of which projection can engage the flat wall of the cutaway portion of the first, triangular projection on the plunger head and the angular wall of the needle-containing assembly can engage the angular wall of said cutaway portion when removal of the needle-containing assembly from the stem and retraction into the barrel cavity is desired.

4,986,814

ONE-PUNCH CATHETER

Bryan T. Burney; Steven L. Griffith; Francis J. Fry, all of Indianapolis, Ind.; Yue-Teh Jang, Houston, Tex.; Pamela M. Thornton, and Vern L. Liebmann, both of Angleton, Tex., assignors to Indianapolis Center for Advanced Research, Indianapolis, Ind.

Filed Jun. 13, 1988, Ser. No. 206,214

Int. Cl.[5] A61M *5/178*

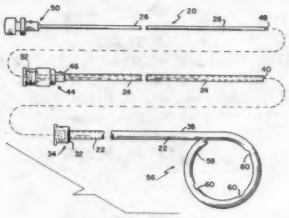
U.S. Cl. 604—164 **4 Claims**

1. A catheter assembly comprising a stylus including a first generally conically shaped end tapering to a point at a predetermined angle and a second end,

a cannula including a first lumen for slidably receiving the stylus, the cannula including a first end having an end wall and a second end,

a catheter including a second lumen for slidably receiving the cannula, the catheter having a first end and a second end, the first end of the catheter including an end wall having an outer surface tapered at the predetermined angle and an inner surface, and

means for aligning the second ends of the stylus, cannula, and catheter so that when the stylus, cannula, and catheter are assembled for insertion into a patient's body, the first end of the stylus projects from the first end of the cannula, the tapered outer surface of the end wall of the catheter is aligned to be substantially coincident with the generally conically shaped end of the stylus to form a generally



conical tip portion of the catheter assembly, and the end wall of the cannula abuts the inner surface of the end wall of the catheter to facilitate insertion of the catheter assembly into the patient's body.

4,986,815

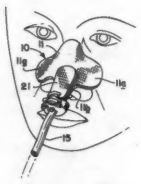
NASOGASTRIC TUBE HOLDING DEVICE

Barry L. Schneider, Deerfield, Ill., assignor to Hollister Incorporated, Libertyville, Ill.

Filed Dec. 11, 1989, Ser. No. 448,224

Int. Cl.[5] A61M *25/00*

U.S. Cl. 604—180 **10 Claims**



1. A nasogastric tube holder, comprising a flexible nose pad having an upper surface and having an adhesive-bearing lower surface for adhesive attachment of the pad over the ridge of a wearer's nose; a mounting pin secured to said pad; said pin having its axis generally parallel with said pad and having an end portion projecting from an edge of said pad; and a pair of opposing clamping jaws pivotally supported by said projecting end portion of said pin for movement between an open position and a plurality of closed positions; said jaws having releasable latching means disposed above said pin for selectively latching said jaws in any of said closed positions; each of said jaws also having a plurality of spaced parallel clamping plates disposed beneath said pin for clamping a nasogastric tube therebetween when said jaws are closed; said clamping plates of one jaw being offset in relation to the clamping plates of the other jaw for interdigitation therewith when said jaws are closed.

4,986,816

NEEDLE UNSHEATHING, RESHEATHING AND HANDLING APPARATUS

Eric L. Steiner; Mark E. Weiss, both of Denver, and Jeffrey T. Samson, Boulder, all of Colo., assignors to On-Gard Systems, Inc., Denver, Colo.

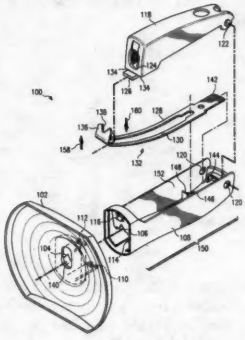
Continuation-in-part of Ser. No. 298,619, Jan. 18, 1989, Pat. No. 4,955,865. This application Jan. 10, 1990, Ser. No. 463,028

Int. Cl.[5] A61M *5/00*

U.S. Cl. 604—192 **11 Claims**

1. An apparatus for selectively retaining a needle sheath, comprising:

housing means having an aperture for receiving the sheath;
engaging means interconnected with said housing means for selectively retaining the sheath, wherein said engaging means comprises:
a first V-shaped support surface which partially defines the periphery of said aperture; and



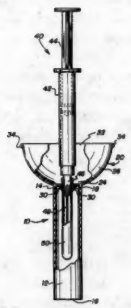
a second V-shaped support surface located within said housing; and
means for selectively controlling retaining engagement of the sheath with said engaging means.

4,986,817

HYPODERMIC SYRINGE SHEATH HOLDER AND NEEDLE GUIDE

James Code, Texarkana, Tex., assignor to International Development Systems, Inc., Fort Smith, Ark.

Filed Nov. 22, 1988, Ser. No. 275,333
Int. Cl.[5] A61M *5/32*
U.S. Cl. 604—192 **4 Claims**



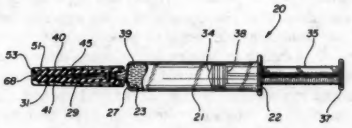
1. A one piece safety device for uncapping and receiving a removable protective sheath of a needle comprising:
an elongated cone-like structure having first and second ends, said first end having a diameter greater than the diameter of said second end and further including sidewalls interconnecting said ends;
said sidewalls being selectively yieldable for grasping and retaining the sheath within said elongated cone-like structure during uncapping and recapping of the needle;
a funnel-shaped member having a small-diameter opening and a large-diameter opening interconnected by arcuate sidewalls, said small-diameter opening thereof communicating with said first end of said elongated cone-like structure and said large diameter opening thereof receiving the sheath during uncapping and receiving the needle during recapping and said arcuate sidewalls guiding the needle and sheath toward said first end of said elongated cone-like structure; and
said elongated cone-like structure and said funnel-shaped member are integrally molded from a resilient member.

4,986,818

SYRINGE ASSEMBLY

Claude Imbert, La Tronche; Jean M. Jouet, Meylan, and Patrick Carre, Voiron, all of France, assignors to Becton, Dickinson and Company, Franklin Lakes, N.J.

Filed Mar. 30, 1990, Ser. No. 502,607
Int. Cl.[5] A61M *5/32*
U.S. Cl. 604—192 **21 Claims**



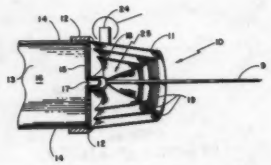
1. A hypodermic syringe assembly comprising:
an elongate barrel having an open proximal end, a chamber for retaining fluid and a tip portion extending from a distal end of said barrel having a passageway therethrough communicating with said chamber;
a needle cannula having a distal end extending outwardly from said tip portion including a lumen therethrough in fluid communication with said passageway;
a needle shield assembly including a resilient needle sheath having an open proximal end, a closed distal end, a sidewall defining a receptacle therein and an annular flange extending radially outwardly from said proximal end, said resilient needle sheath being positioned within an elongate rigid needle shield having a continuous open proximal end, a distal end and a sidewall therebetween defining a needle shield longitudinal axis;
means for holding said sheath within said shield so that said sheath cannot be removed from said shield during normal use of said syringe assembly, said holding means including a flange receiving aperture in said needle shield sidewall adjacent to said open proximal end, said aperture having a ledge on the proximal side of said aperture for engaging the proximal side of said flange for holding said sheath in said shield, said holding means also including deflecting means for contacting and deflecting said annular flange causing more of said annular flange to project into said flange receiving aperture than if said deflecting means were not included;
said sheath including cannula sealing means at said distal end of said receptacle for providing a fluid-tight seal between said lumen and the environment of said syringe assembly;
said needle shield assembly being positioned with said distal end of said cannula engaging said cannula sealing means and said proximal end of said sheath removably engaging said tip portion to hold said shield assembly on said barrel while simultaneously sealing said lumen of said cannula so that said sheath surrounds the entire portion of said cannula which extends outwardly from said tip portion; and
said needle shield assembly being easily engageable to and removable from said barrel and said cannula using manual force applied to said shield.

4,986,819

PRESSURE SENSITIVE NEEDLE GUARD

Daniel Sobel, 5 Hedge Ct., Snyder, N.Y. 14226

Filed Sep. 26, 1989, Ser. No. 412,739
Int. Cl.[5] A61M 5/32
U.S. Cl. 604—198 18 Claims



1. A pressure-sensitive needle guard for preventing needle-stick or reuse of a hypodermic needle attached to a forward portion of a barrel of a hypodermic syringe, comprising:

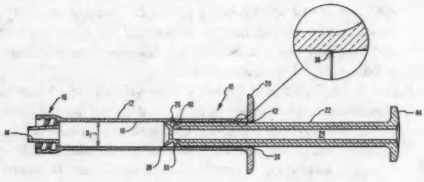
an expandable guard member that is positionable upon the forward portion of said barrel of said hypodermic syringe, said expandable guard member being movable between a first, non-expanded position wherein said hypodermic needle is free to cause a puncture, and a second, expanded position wherein said guard has expanded to cover said tip of said hypodermic needle, said expandable guard member including an internal pressure-sensitive chamber means which when pressurized causes said guard member to expand to said second, expanded condition.

4,986,820

SYRINGE APPARATUS HAVING IMPROVED PLUNGER

Dan E. Fischer, Sandy, Utah, assignor to Ultradent Products, Inc., Salt Lake City, Utah

Filed Jun. 23, 1989, Ser. No. 370,618
Int. Cl.[5] A61M 5/315
U.S. Cl. 604—218 13 Claims



1. A syringe comprising:

barrel means for containing a fluid, said barrel means comprising a bore provided therein and having a bore wall which has a first diameter and aperture means through which said fluid is expelled; and

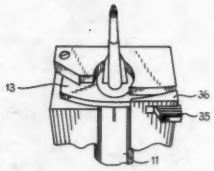
plunger means for expelling the fluid from the barrel means through the aperture means, said plunger means having a tip comprising a first contact means for maintaining a fluid-tight seal with said bore wall, said first contact means comprising a diameter slightly greater than said first diameter and said tip further comprising a second contact means for maintaining stability and providing a smooth glide of said plunger means in said bore, and for providing a secondary fluid seal, said second contact means comprising a diameter slightly greater than said first diameter but slightly less than the diameter of said first contact means, and wherein the tip and said first and second contact means are formed from the same material and as a unitary part of said plunger means.

4,986,821

DROP DETECTION HOUSING WITH POSITIVE TACTILE SIGNALING

Dean L. Kamen, 46 Gage Rd., Bedford, N.H. 03102

Continuation of Ser. No. 77,056, Jul. 17, 1987, abandoned, which is a continuation of Ser. No. 868,258, May 28, 1986, abandoned. This application Aug. 9, 1988, Ser. No. 231,600
Int. Cl.[5] A61M 5/00
U.S. Cl. 604—251 14 Claims



1. A medical infusion controller switching kit comprising:

a first drip chamber having a body and having a first flange extending from said body, said first flange having a first pair of nubs disposed in a first pair of locations, said first drip chamber being designed to form drops of a first size;

a second drip chamber having a body and having a second flange extending from said body, said second flange having a second pair of nubs disposed in a second pair of locations different from said first pair of locations, said second drip chamber being designed to form drops of a second size;

a switch set having a first pressure-sensitive element disposed in a first switching location corresponding to one of said first pair of predetermined locations of said nubs on said first flange, said switch set also having a second pressure-sensitive element disposed in a second switching location corresponding to one of said second pair of predetermined locations of said nubs on said second flange;

means for mounting one of said drip chambers in said switch set in a single orientation only to urge one of said nubs against a corresponding pressure sensitive element to activate said element; and

signal processing means, responsive to the switch set for causing the system to enter into one of a plurality of predetermined standard modes of operation depending on which pressure-sensitive element in the switch set is activated.

4,986,822

RECTAL-COLON DILATOR AND COLLECTOR ASSEMBLY

Irvin B. Anderson, 215 W. College St., Florence, Ala. 35630

Filed Sep. 6, 1988, Ser. No. 240,512
Int. Cl.[5] A61M 31/00
U.S. Cl. 604—276 3 Claims

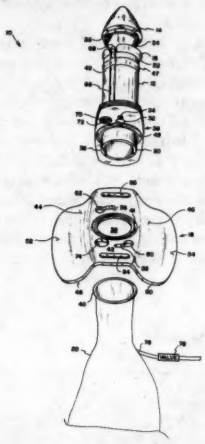
1. A rectal-colon dilator and fecal collector assembly comprising:

a tubular member for insertion through the rectum and into the colon of a patient and having a radially flared-out insertable end and an outside end;

a meltable cap closing said insertable end;

a base member attachable to the outside end of said tubular member for supporting the same externally to the patient's body, said base member being saddle-shaped and having a flat middle portion with a circular aperture adapted to be placed over the patient's rectum and generally perpendicular thereto and side portions spaced apart from and gen-

erally parallel to said middle portion and adapted to engage said patient's buttocks;



a ring of swellable absorbent material disposed on the outside of said tubular member in spaced-apart relation from said flared-out insertable end; and

a collector bag sealably attached to said tubular member.

4,986,823

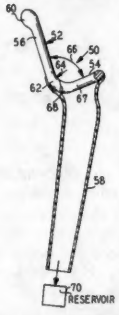
URINARY AID FOR HUMAN FEMALES

Verne M. Anderson, 6218 N. Harlem, and Laurence A. Levine, 1903 N. Hudson Ave., both of Chicago, Ill. 60614

Filed May 5, 1989, Ser. No. 348,278

Int. Cl.[5] A61F *5/44*

U.S. Cl. 604—329 **36 Claims**



1. A urinary aid to be worn by human females, comprising:

a body of flexible material including:

first and second limbs configured to be worn intravaginally, said limbs subtending an acute angle to one another when in a relaxed position, each of said first and second limbs having a bulbuous free end, said free ends being unconnected to form an open end of said body, said first and second limbs lying generally in a first plane,

a collector lying in a plane distinct from the first plane, said collector having a central opening configured to be positioned about the urethral meatus when said limbs are positioned intravaginally; and

a hollow collection tube having an opening, said hollow collection tube being connected to said collector in a position so that said open end of said tube is in registration with said central opening in said collector.

4,986,824

OSTOMY COUPLING INCLUDING GAS FILTER CARTRIDGE

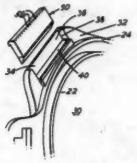
Peter L. Steer, Sussex; Neil P. Wiltshire, and David J. Auld, both of Surrey, all of England, assignors to E. R. Squibb & Sons, Inc., Princeton, N.J.

Filed Dec. 11, 1989, Ser. No. 449,033

Claims priority, application United Kingdom, Dec. 14, 1988, 8829134

Int. Cl.[5] A61F *5/44*

U.S. Cl. 604—333 **6 Claims**



1. A bagside coupling attached to an ostomy bag comprising a coupling element designed for cooperation with a bodyside coupling element and having a portion which surrounds a stomal orifice, the coupling element having structure coupled to and extending away from said portion, said structure defining a recess and having a wall with a line of weakening therein, the wall separating a space adjacent said portion from the space defined by the recess; said space adjacent said portion being in communication with the interior of said bag through an opening therein; and a filter cartridge comprising a box-like casing containing a filter/deodorizing medium, the casing having entry and exit holes for gas, and walls at one end which are formed to provide a blade-like edge, the gas entry hole being adjacent to said one end, said filter cartridge designed and dimensioned so that it can be pushed into the recess whereupon said blade like edge of the cartridge penetrates and breaks the line of weakening, so that gas within the bag flows into the cartridge and through the filter medium therein, and gas leaves the cartridge to pass into the ambient atmosphere through said gas exit holes.

4,986,825

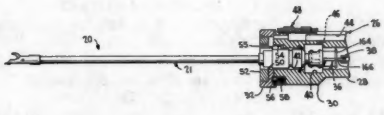
SURGICAL CUTTING INSTRUMENT

F. Barry Bays, Seminole, and Arthur F. Trott, Largo, both of Fla., assignors to Concept, Inc., Largo, Fla.

Filed Oct. 11, 1988, Ser. No. 255,331

Int. Cl.[5] A61B *17/32*

U.S. Cl. 604—22 **20 Claims**



1. A surgical cutting and aspirating instrument comprising

elongate probe means having a distal end, a proximal end adapted to communicate with a vacuum source, and suction passage means extending between said distal end and said proximal end for aspirating cut tissue;

tissue cutting means disposed at said distal end of said probe means for cutting bodily tissue including a movable cutting member; and

tissue comminuting means disposed at said distal end of said probe means and movable in a different path relative to said cutting member for comminuting bodily tissue cut by

said tissue cutting means prior to aspiration of the cut tissue through said suction passage means.

4,986,826

METHOD AND APPARATUS FOR REMOVING PROSTHETIC CEMENT

Gregory J. Roger, 5 Kent Street, Collaroy, Australia 2097

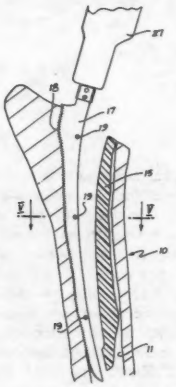
PCT No. PCT/AU88/00019, § 371 Date Sep. 20, 1989, § 102(e) Date Sep. 20, 1989, PCT Pub. No. WO88/05645, PCT Pub. Date Aug. 11, 1988

PCT Filed Jan. 28, 1988, Ser. No. 393,909

Claims priority, application Australia, Jan. 29, 1987, PI0090

Int. Cl.[5] A61B *17/14*

U.S. Cl. 606—82 9 Claims



5. A cutting blade for use in the removal of prosthetic cement from the medullary canal of a patient's long bone during the replacement of a joint prosthesis, comprising a substantially planar blade having a cutting edge, the edge having a profile substantially corresponding to the profile of the line of intersection of a plane, which extends longitudinally through the long bone, the prosthetic cement and a prosthetic cavity therein, and a cement/bone interface intersected by that plane, and cutting depth limiting means on the blade, the depth limiting means being spaced from an adjacent point on the cutting edge by a distance substantially equal to the depth of the prosthetic cement at the corresponding point along the said line.

4,986,827

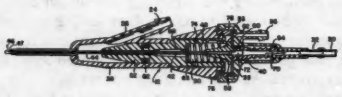
SURGICAL CUTTING INSTRUMENT WITH RECIPROCATING INNER CUTTER

Tamer Akkas, and Ted Carlson, both of Mission Viejo, Calif., assignors to Nestle S.A., Fort Worth, Tex.

Division of Ser. No. 116,796, Nov. 5, 1987, Pat. No. 4,909,249. This application Mar. 16, 1990, Ser. No. 494,536

Int. Cl.[5] A61F *17/32*

U.S. Cl. 606—107 10 Claims



1. A surgical cutting instrument comprising:

a diaphragm assembly connectable to a source of pressure,

an inner cutter operatively connected to said diaphragm assembly, connectable to a source of vacuum, and defining a cutting surface,

an outer cutter positioned outside of said inner cutter and defining a suction port,

a biasing means for biasing said inner cutter against the bias caused by the force of the source of pressure on said inner cutter via said diaphragm assembly,

said biasing means and the operation of the source of pressure causing said cutting surface to reciprocate relative to said port and to thereby cut the matter drawn into said port by the operation of the source of vacuum, and

said diaphragm assembly including a transverse portion and including flexible means connected to and movable with a proximal end portion of said inner cutter for being expandable and contractible generally along a longitudinal axis of said inner cutter in response to the reciprocation of said inner cutter.

4,986,828

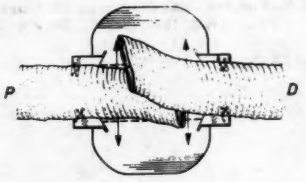
NERVE CONNECTOR AND METHOD

Luis de Medinaceli, 6301 Stevenson Ave., Alexandria, Va. 22304

Filed Jan. 23, 1990, Ser. No. 468,700

Int. Cl.[5] A61B *17/00*

U.S. Cl. 606—152 13 Claims



1. An apparatus for reconnecting the proximal and distal stumps of a transected cable-like organ such as blood vessels, tendons, nerves and the like and comprising:

(a) an elongate template means having opposed first and second edges and opposed first and second ends,

(b) a nerve connecting guide means formed on the surface of said template means comprising:

(i) a nerve positioning means on said template and extending between said first and second edges,

(ii) a pair of stump measuring lines perpendicular to said nerve positioning means for indicating the positioning of the respective ends of the nerve stumps,

(iii) first and second slot means associated with said template means, said first slot means proximate the first end and said second slot means proximate said second end,

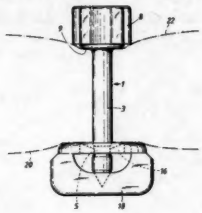
(c) a connector means adapted to be slidably received within said first and second slot means, whereby when the respective ends of the nerve stumps are positioned on the template and the nerve stumps are sutured to the connector means prior to cutting of the nerve stumps and removal of the template means, the reunion of the nerve stumps will be in accordance with a postulate derived from the principle of Saint-Venant and the zone of reunion will be free of foreign matter and substantially free of stress thereby enhancing healing.

4,986,829

EAR PIERCING DEVICE

Karl Blomdahl, Harplinge, Sweden, assignor to Lars Blomdahl AB, Halmsad, Sweden

PCT No. PCT/SE88/00016, § 371 Date Aug. 31, 1988, § 102(e) Date Aug. 31, 1988, PCT Pub. No. WO88/05273, PCT Pub. Date Jul. 28, 1988
PCT Filed Jan. 21, 1988, Ser. No. 246,549
Claims priority, application Sweden, Jan. 21, 1987, 8700236
Int. Cl.[5] A61B 17/34
U.S. Cl. 606—188 2 Claims



1. An ear piercing device comprising a piercing pin and a retaining piece, said retaining piece being positionable between the earlobe and the head of a person, said retaining piece is provided with retaining means including locking edges around the opening, said locking edges being capable of bending towards the retaining piece and of resiliently contacting peripheral surfaces of the piercing pin when the pin is inserted into the opening, said piercing pin being provided with a pointed forward end, able to pierce the earlobe, said retaining piece having an opening and a counter bore, able to receive and hold the forward end of the piercing pin, said counterbore having a bottom surface forming an end stopper for the pointed forward end of the piercing pin, said piercing pin having a waist portion near the pointed forward end, but at a distance therefrom, and located such that when the forward end of the piercing pin comes to a stop against the end stopper, the locking edges of the opening of the retaining piece fasten tightly around said waist portion, the opening of said retaining piece having a number of slits directed outwardly from a central portion having a circumference which is smaller than the circumference of the pin, at a location between the waist portion and the pointed forward end of the pin, said piercing pin and retaining piece being capable of attaining:

(a) an initial positioning mode, wherein said piercing pin and retaining piece are positioned at opposite sides of the earlobe in a chosen position where a hole is to be made in the earlobe,

(b) a piercing mode, wherein the piercing pin is given a high velocity by a force acting on the piercing pin in a direction towards the earlobe and the retaining piece, whereby said piercing pin pierces the earlobe and moves with its forward end through the opening into the counterbore of the retaining piece, and

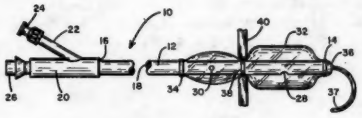
(c) a final positioning mode, wherein the piercing pin has been slowed down to a stop by means of striking with its forward end against the bottom surface of the counterbore and wherein the piercing pin is retained in the retaining piece.

4,986,830

VALVULOPLASTY CATHETER WITH BALLOON WHICH REMAINS STABLE DURING INFLATION

Robert C. Owens, Forest Lake, and Mark A. Rydell, Golden Valley, both of Minn., assignors to Schneider (U.S.A.) Inc., Minneapolis, Minn.

Filed Sep. 22, 1989, Ser. No. 410,852
Int. Cl.[5] A61M 29/00
U.S. Cl. 606—194 4 Claims



1. A valvuloplasty catheter comprising:

(a) an elongated flexible, plastic, tube having a proximal end and a distal end and a lumen extending from said proximal end to said distal end, said tube including at least two longitudinally spaced ports of differing cross-sectional areas extending radially through said tube and intersecting said lumen, said ports being disposed at the distal end portion of said tube;

(b) a tubular inflatable expander member encircling said tube and overlaying said longitudinally spaced ports, said expander member being bonded circumferentially to said tube at opposed ends of said expander member; and

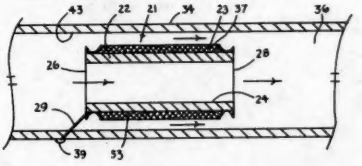
(c) means for injecting an inflation fluid into said lumen at said proximal end such that when said expander member is constricted intermediate said longitudinally spaced ports, both ends of said expander member simultaneously inflate but at differing rates on either side of the constriction.

4,986,831

MEDICAL IMPLANT

Wendell L. King, North Oaks; Lawrence M. Kane, Roseville, and Theodore P. Adams, Edina, all of Minn., assignors to Angelon Corporation, Plymouth, Minn.

Filed Apr. 25, 1988, Ser. No. 186,002
Int. Cl.[5] A61F 2/06
U.S. Cl. 623—1 18 Claims



1. A prosthetic device for promoting controlled collagenous tissue growth when suspended in the lumen of a blood vessel in the presence of blood flow which comprises:

(a) Tubular substrate means having a generally cylindrical outside surface and a generally cylindrical inside surface terminating at first and second open ends to permit blood flow along said inside surface,

(b) At least one of said surfaces being a thrombogenic surface to promote growth of collagenous tissue along such thrombogenic surface and

(c) Tether means for positioning the tubular substrate means within the lumen so as to allow fluid flow within the lumen to contact both the inside and outside surfaces of the tubular substrate means, said tether means having a first attachment to the substrate means and a second at-

tachment, spaced apart from the first attachment, for attaching to the lumen.

4,986,832

ARTIFICIAL BLOOD VESSEL AND PROCESS FOR PREPARING IT

Noriaki Kaneko; Yoshimi Hirata, and Masahiro Moriwaki, all of Yokohama, Japan, assignors to Ube Industries, Ltd., Ube, Japan

Filed Aug. 25, 1988, Ser. No. 236,547

Claims priority, application Japan, Sep. 4, 1987, 62-220351; Sep. 4, 1987, 62-220352; Sep. 4, 1987, 62-220353

Int. Cl.[5] A61F *2/06*

U.S. Cl. 623—1 10 Claims

1. An artificial blood vessel comprising a vessel wall that is comprised of two layers which have interfaces therebetween and wherein

a porous innermost first layer has an open-cell structure in which the cells communicate with each other through interconnecting pores and has a thickness of at least 5 μm and not more than ⅓ of the total wall thickness of the vessel wall; and

a second layer which is contiguous to said innermost layer, and has a closed cell structure which prevents blood from permeating therethrough, said closed cell structure comprising closed cells which do not communicate with each other or with the open cells of the innermost layer.

4,986,833

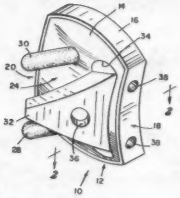
GLENOID COMPONENT FOR AN ARTIFICIAL SHOULDER JOINT

Richard L. Worland, 8721 Ruggles Rd., Richmond, Va. 23229

Filed May 5, 1989, Ser. No. 347,866

Int. Cl.[5] A61F *2/40*

U.S. Cl. 623—19 5 Claims



1. In an artificial shoulder joint having a glenoid component and a humeral component, the glenoid component having a humerally facing concave articulating surface on which a ball of the humeral component articulates, an opposite scapular facing surface, a posterior side, a anterior side and at least one fixation member extending from the scapular facing surface outwardly towards the posterior side at an oblique angle to the scapular facing surface.

4,986,834

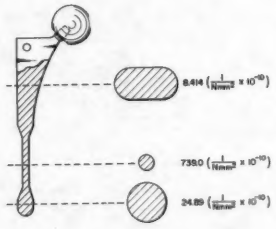
LOAD SHARING FEMORAL HIP IMPLANT

Todd Smith, Warsaw, and David C. Kelman, Winona Lake, both of Ind., assignors to Boehringer Mannheim Corporation, Indianapolis, Ind.

Continuation of Ser. No. 391,660, Aug. 8, 1989, abandoned, which is a continuation of Ser. No. 238,913, Aug. 31, 1988, abandoned. This application Mar. 30, 1990, Ser. No. 503,121

Int. Cl.[5] A61F *2/34*

U.S. Cl. 623—23 22 Claims



1. A component of an artificial joint for replacing a damaged natural joint in a skeletal structure of a body which includes a prosthesis having a first cooperating member secured to a first, long, bone having an intramedullary canal and a second cooperating member secured either to a second bone or being a natural part of the second bone, the first and second cooperating members being interengaging and relatively movable to permit relative movement between the first and second bones, said component comprising:

an elongated stem having a longitudinal axis lying generally in a coronal plane and said stem configured to be implanted into the intramedullary canal of the first bone; and

said stem defining proximal, intermediate and distal segments, each segment having a predetermined length terminating at respective proximal and distal ends, said proximal end of the proximal segment being integral with said first cooperating member and said distal end of the distal segment defining a terminal end of the stem;

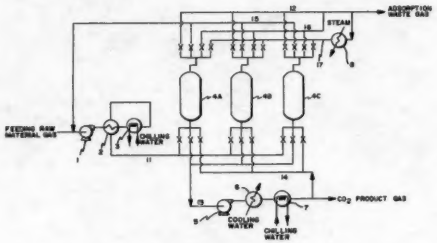
said distal end of the proximal segment and the proximal end of the distal segment being directly adjacent to and forming a tapered junction with said proximal and distal ends of the intermediate segment, respectively; and

wherein the cross-sectional area of the intermediate segment is uniform and reduced over the length thereof up to 75% of the cross-sectional area of a comparable non-contoured stem to thereby affect the mass moment of inertia at any given location along the length of the stem and thereby achieve an optimal stem flexibility.

4,986,835
PROCESS FOR SEPARATING AND RECOVERING CARBONIC ACID GAS FROM GAS MIXTURE BY ADSORPTION

Masaru Uno; Kanji Ueda; Masahiro Inoue, and Shinichi Kaji, all of Hyogo, Japan, assignors to Seitetsu Kagaku Co., Ltd., Hyogo, Japan

Filed Aug. 23, 1989, Ser. No. 397,469
Claims priority, application Japan, Dec. 26, 1987, 62-331729
Int. Cl.[5] B01D *53/04*
U.S. Cl. 55—26 6 Claims



1. A process for separating and recovering a high purity carbonic acid gas from a wet mixed gas containing carbonic acid gas according to a pressure swing adsorption and separation method which comprises using a pressure swing adsorption and separation apparatus having at least three adsorbers, each of which is paced with alumina gel and zeolite, comprising the steps of:

providing the amount of carbonic acid gas in a feeding raw material gas at least 8% by volume;

providing the alumina gel at a composition of 20 to 50% by weight of Al_2O_3 and 80 to 50% by weight of SiO_2, and packed at a feeding gas inlet side of the adsorber;

providing a 10A type zeolite packed at the downstream side of the adsorber;

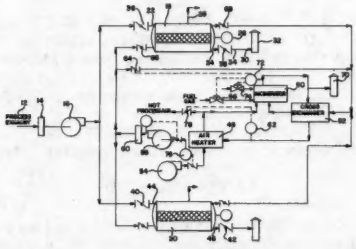
providing a packing volume ratio of the alumina gel to zeolite of between 1:10 and 1:2; and

carrying out the steps of adsorption, washing, desorption and pressurization in each adsorber in one operation sequence.

4,986,836
FILTER SYSTEM TO REMOVE ENVIRONMENTALLY HARMFUL PRODUCTS

Jag S. Tandon, Northbrook, Ill., assignor to American Environmental International, Inc., Northbrook, Ill.

Filed May 15, 1989, Ser. No. 351,658
Int. Cl.[5] B01D *53/04*
U.S. Cl. 55—161 6 Claims



1. A system for the adsorption of volatile organic compounds from a contaminated gas stream, comprising:

a. a filter for the removal of particulates from said contaminated gas stream;

b. a blower for drawing said contaminated gas stream through said filter, and for thereafter transporting said contaminated gas stream at a proper design velocity;

c. a first granulated activated carbon filter having an inlet and an outlet, said first carbon filter receiving said contaminated gas stream at said inlet and under pressure from said blower;

d. said first activated carbon filter including inner capillaries or passages for adsorbing substantially all of said volatile organic compounds from said contaminated gas stream, whereby said contaminated gas stream becomes a substantially vapor-free gaseous stream which is largely free of said volatile organic compounds when said low-vapor stream exits said first carbon filter at said outlet, and is discharged to the atmosphere through a stack;

e. a continuous analyzer and recorder to monitor the concentration of volatile organic compounds at said stack;

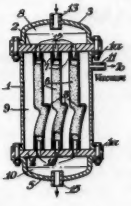
f. control means for diverting the flow of said contaminated gas stream from said first carbon filter to a second carbon filter when said analyzer detects volatile organic compounds at a given level in said low-vapor stream; and

g. regeneration means for removing said volatile organic compounds from said first carbon filter by applying a hot, oxygen-deprived regeneration gaseous stream thereto when said contaminated gas stream has been diverted to said second carbon filter, said regeneration means including a source of ambient air, incinerator means for receiving said source of air to reduce the oxygen content thereof below a given level which will not cause a fire hazard in said filter, oxygen control sensing means for sensing the amount of oxygen in the output of said incinerator means, means for feeding the incinerated, heated air constituting said regeneration gaseous stream to said filter only when said sensing means senses that the oxygen content of said incinerated air is below said given level, and means for feeding the regeneration gaseous stream removed from the carbon filter being regenerated to said incinerator means for reducing the amount of organic contents in said stream prior to disposing of the same.

4,986,837
APPARATUS FOR DEGASSING A LIQUID

Yoshihiko Shibata, 83-11 Matsushin-cho, Okayama-shi 704, Japan

Filed Dec. 9, 1987, Ser. No. 130,634
Claims priority, application Japan, Dec. 12, 1986, 61-190485[U]
Int. Cl.[5] B01D *19/00*
U.S. Cl. 55—190 4 Claims



1. Apparatus for degassing a liquid containing a gas comprising:

a vacuum chamber,

inlet supply means to said vacuum chamber for feeding liquid to be degassed into said vacuum chamber,

outlet discharge means from said vacuum chamber through which degassed liquid is discharged, and

at least one porous, hydrophobic tube of porous, expanded

polytetrafluoroethylene (PTFE) extending from said inlet supply means, through said vacuum chamber and to said outlet discharge means,

each said porous, hydrophobic tube having, near its inlet end, means for atomizing said liquid to be degassed as it enters said tube,

whereby, as liquid containing gas enters said porous, hydrophobic tube and is atomized by said means for atomizing said liquid, said gas passes through said porous tube and out of said vacuum chamber and the remaining degassed liquid exits said porous tube through said outlet discharge means.

4,986,838

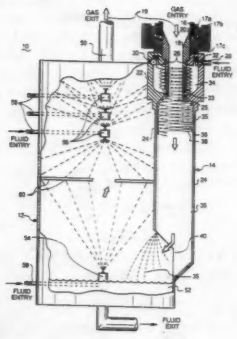
INLET SYSTEM FOR GAS SCRUBBER

Mark W. Johnsgard, Campbell, Calif., assignor to Airgard, Inc., Campbell, Calif.

Filed Jun. 14, 1989, Ser. No. 365,887

Int. Cl.[5] B01D *45/16, 47/16*

U.S. Cl. 55—223 **19 Claims**



1. An improved inlet system **14** for a silicon gas scrubber **10** having a well flushed first scrubbing chamber **12** with a first cross sectional area and into which the inlet system **14** communicates, comprising:

an elongated vertically disposed transition tube **24** having an upper end for receiving particulate carrying gas and a lower end for transferring said gas into said first scrubbing chamber, said lower end having a second cross sectional area substantially smaller than said first cross sectional area such that the velocity of the gases flowing through said transition tube is reduced upon passing out of said lower end;

means for introducing a substantially mist free swirling flow of washing fluid into said upper end of said transition tube in a manner such that all walls within said transition tube between said upper end and said lower end are thoroughly coated with said washing fluid; and

an unwetted gas inlet pipe **18** having a discharge end extending into said upper end of said transition tube for introducing said gas into said transition tube, whereby the buildup of particulate from said gas on the walls of said transition tube and said inlet pipe is substantially prevented.

4,986,839

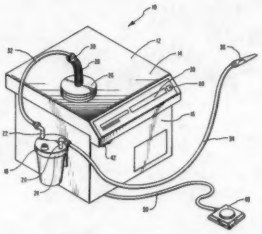
SELF-CONTAINED AIR ENHANCEMENT AND LASER PLUME EVACUATION SYSTEM

Thomas J. Wertz, The Woodlands; Russell W. Todd, and Gerald D. Abell, both of Spring, all of Tex., assignors to Surgical Laser Products, Inc., The Woodlands, Tex.

Filed Nov. 10, 1988, Ser. No. 269,629

Int. Cl.[5] B01D *19/00*

U.S. Cl. 55—274 **16 Claims**



1. A self-contained air enhancement system for removing contaminants from a laser plume produced at a surgical site during a medical procedure, said system comprising:

a housing;

an inlet tube for removing the laser plume from the surgical site;

a suction canister secured to said housing and being in communication with said inlet tube for removing liquid components of the contaminants from the laser plume;

a prefilter located in said housing and being in communication with said suction canister for removing particulates from the laser plume;

a filter canister located in said housing and being in communication with said suction canister, said filter canister housing a primary filter capable of removing substantially all of the remaining fine particulates from the laser plume and containing charcoal for removing the odor from the laser plume to produce filtered air;

means located in said housing downstream of said filter canister for creating suction to pull the laser plume in sequence through said inlet tube, said suction canister, said prefilter, and said primary filter;

outlet means in said housing for expelling said filtered air from said housing;

inlet means located in said housing for providing ambient air for cooling said means for creating suction; and

means for shielding the laser plume within the housing from cross-contamination of the ambient air for cooling said means for creating suction.

4,986,840

CHARCOAL CANISTER FOR USE IN A FUEL PURGE SYSTEM OF AN INTERNAL COMBUSTION ENGINE

Eiji Mori, Okazaki; Hidefumi Sonoda, Toyota; Akira Hiraku, Toyota; Morio Minezawa, Toyota; Isao Kato, Toyota, and Koichi Ito, Toyota, all of Japan, assignors to Toyota Jidosha Kabushiki Kaisha, Toyota, Japan

Filed Aug. 11, 1989, Ser. No. 392,829

Claims priority, application Japan, Aug. 11, 1988, 63-105406[U]

Int. Cl.[5] B01D *53/00*

U.S. Cl. 55—316 **10 Claims**

1. A charcoal canister for use in a fuel purge system of an internal combustion engine having an intake passage, said canister comprising:

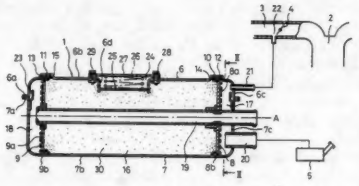
an axially extending housing, said housing including two housing elements divided along a separation line which extends along an axis of said housing;

an activated carbon layer arranged in a central portion of an interior of said housing in an axial direction of said housing and extending over an entire cross section of said interior of said housing, which is perpendicular to said axis of said housing;

a first chamber formed in said interior of said housing at one axial end portion of said housing and defined by one end of said activated carbon layer;

a second chamber formed in said interior of said housing at the other axial end portion of said housing and defined by the other end of said activated carbon layer;

a first pipe connected to said first chamber for feeding fuel vapor into said first chamber and extending outwardly from a housing wall portion which defines said first chamber;



a second pipe connecting said first chamber to said intake passage and extending outwardly from said housing wall portion;

a third pipe connected to said second chamber for feeding air into said second chamber and extending outwardly from said housing wall portion;

a separator arranged at each axial end of said activating carbon layer, said one end of said activated carbon layer and said other end of said activated carbon layer are respectively defined by said separators; and

two recesses formed at an inner surface of one of said housing elements, each separator having a portion fitted into one of said recesses and another portion fixed to an inner surface of said other housing element.

4,986,841

METHOD OF PREPARING AN ALKALI METAL DIFFUSION PREVENTIVE LAYER

Keiji Oyoshi; Takashi Tagami, and Shuhei Tanaka, all of Tsukuba, Japan, assignors to Nippon Sheet Glass Co., Ltd., Japan

Filed Apr. 18, 1990, Ser. No. 510,843
Int. Cl.[5] C03C *17/23*
U.S. Cl. 65—30.13 **4 Claims**

1. A method of preparing an alkali metal diffusion preventive layer of forming an alkali metal diffusion preventive layer containing phosphorus at the inside of a substrate containing silica by ion implantation of phosphorus, wherein one of the following means (a) to (c) is applied:

(a) the phosphorus ion implantation and oxYgen ion implantation are applied simultaneously or alternately and, subsequently, heat treatment is applied to the substrate,

(b) ion implantation of phosphorus is applied and, subsequently ion implantation of oxygen is applied while heating the substrate, and

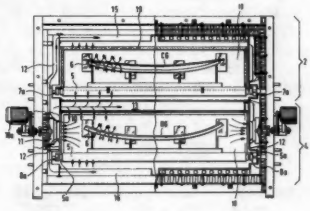
(c) ion implantation of phosphorus was applied and subsequently, heat treatment is applied to the substrate in an atmosphere containing an oxygen gas.

4,986,842

HEAT TRANSFER METHOD IN A GLASS SHEET BENDING FURNACE AND BENDING FURNACE

Esko J. Peltonen, Kangasala, Finland, assignor to Tamglass Oy, Tampere, Finland

Filed Nov. 14, 1989, Ser. No. 435,999
Claims priority, application Finland, Nov. 24, 1988, 885450
Int. Cl.[5] C03B *23/025, 27/044*
U.S. Cl. 65—104 **8 Claims**



1. A method of heat transfer in a glass sheet bending furnace which includes a top array of successive heating sections for heating glass sheets and a bottom array of successive cooling sections for cooling said glass sheets, wherein said method comprises:

advancing at least one cold piece of glass through at least one of said heating sections on an upper conveyor track;

advancing at least one hot piece of glass through at least one of said cooling sections on a lower conveyor track; and

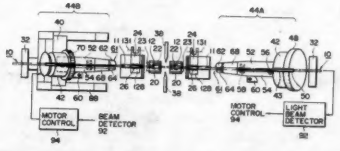
transferring heat from said at least one hot piece of glass to said at least one cold piece of glass by sucking air from said at least one cooling sections and blasting said air into both said at least one heating sections and said at least one cooling section.

4,986,843

APPARATUS FOR FUSION-SPLICING A PAIR OF POLARIZATION MAINTAINING OPTICAL FIBERS

Kenichiro Itoh; Takeshi Yamada; Tsutomu Onodera, all of Sakura; Mikio Yoshinuma, Yachiyo, and Yasuyuki Kato, Mito, all of Japan, assignors to Fujikura Ltd. and Nippon Telegraph and Telephone Corporation, both of Tokyo, Japan

Continuation of Ser. No. 07/051,741, May 18, 1987, abandoned
Filed Jul. 11, 1989, Ser. No. 379,690
Claims priority, application Japan, May 20, 1986, 61-115901; May 20, 1986, 61-115902; May 20, 1986, 61-115903; May 20, 1986, 61-115904
The portion of the term of this patent subsequent to Mar. 27, 2007, has been disclaimed.
Int. Cl.[5] C03B *23/20*
U.S. Cl. 65—152 **2 Claims**



1. An apparatus for fusion-splicing a pair of polarization maintaining optical fibers, comprising:

a first clamp means for clamping an end portion of one of a pair of polarization maintaining optical fibers having a first axis, and manual rotation means to rotate said one clamped optical fiber end portion about said first axis to enable a fast coarse rotational alignment;

a second clamp means for clamping an end portion of the

other of said pair of polarization maintaining optical fibers having a second axis, and being rotatable to rotate said end portion of said other clamped optical fiber about said second axis, said first and second clamp means positioning said end portions of the pair of optical fibers to align said first axis with said second axis;

motor means coupled to said second clamp means for rotating the second clamp means to rotate the end portion of said other optical fiber about said second axis to achieve a fine rotational alignment;

motor control means connected to said motor means for controlling the rotation of said motor means to minimize an extinction ratio of said pair of optical fibers; and

fusion splicing means, located between said first and second clamp means, for fusion-splicing the aligned end portions of said pair of optical fibers by an arc discharge after said fibers are aligned with each other.

4,986,844
GLASSWARE FORMING MACHINE OF THE INDIVIDUAL SECTION TYPE

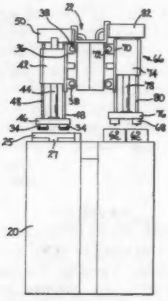
Frank A. Fenton, Granby, Conn., assignor to Emhart Industries, Inc., Towson, Md.

Filed May 15, 1989, Ser. No. 352,222

Claims priority, application United Kingdom, May 27, 1988, 8812626

Int. Cl.[5] C03B *9/16, 9/193*

U.S. Cl. 65—229 **2 Claims**



1. An individual section glassware forming machine comprising

an individual section having a blank mold at one side, a blow mold at the other side and a neck ring assembly rotatively displaceable about a horizontal axis located therebetween,

baffle means associated with said blank mold,

blowhead means associated with said blow mold and,

rail means for supporting said baffle means and said blowhead means for linear displacement parallel to said neck ring assembly axis between remote and operative positions.

4,986,845
PYRAZOLE DERIVATIVES AND HERBICIDES CONTAINING THEM

Eiichi Oya; Junichi Watanabe; Yasuo Kondo; Takuya Kakuta, all of Funabashi; Koichi Suzuki, Shiraoka; Tsutomu Nawamaki, Shiraoka, and Shigeomi Watanabe, Shiraoka, all of Japan, assignors to Nissan Chemical Industries Ltd., Tokyo, Japan

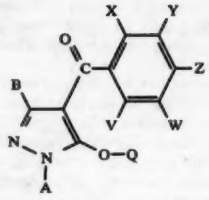
Filed Jun. 21, 1989, Ser. No. 369,523

Claims priority, application Japan, Jul. 15, 1988, 63-176758; Feb. 3, 1989, 1-26030

Int. Cl.[5] A01N *43/56;* **C07D** *401/12, 413/12, 231/20*

U.S. Cl. 71—92 **5 Claims**

1. A pyrazole derivative of the formula I



(I)

wherein

A is a C_1–C_4 alkyl group, a C_2–C_4 alkenyl group or a C_2–C_4 alkynyl group;

B is a hydrogen atom, a C_1–C_3 alkyl group, a halogen atom, a C_1–C_3 haloalkyl group, a C_1–C_3 alkoxy group, a C_1–C_3 alkylthio group, a C_2–C_4 alkoxyalkyl group, a C_2–C_4 alkylthioalkyl group or a C_2–C_4 alkoxycarbonyl group;

X is a C_1–C_6 alkyl group, a C_1–C_6 alkoxy group, a halogen atom, a nitro group, a cyano group, a C_1–C_6 haloalkyl group, a C_2–C_6 alkoxyalkyl group, a C_2–C_6 alkylcarbonyl group, a C_2–C_6 alkoxycarbonyl group, an aminocarbonyl group substituted independently by hydrogen or by a C_1–C_6 alkyl group, a C_1–C_6 haloalkoxy group, a C_1–C_6 alkylthio group or a C_2–C_6 alkylthioalkyl group;

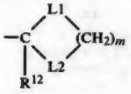
Y is —OR^1 (wherein R^1 is a C_3–C_8 cycloalkyl group, a C_4–C_8 cycloalkylalkyl group, a C_3–C_6 alkenyl group, a C_2–C_6 alkynyl group, a C_1–C_6 haloalkyl group, a C_3–C_8 halocycloalkylalkyl group, a C_3–C_6 haloalkenyl group, a C_2–C_6 haloalkynyl group, a C_2–C_6 nitroalkyl group or a phenyl group which may be substituted by a C_1–C_3 alkyl group, a halogen atom, a nitro group or a C_1–C_3 alkoxy group), —O—L—O—R^1 (wherein L is a C_1–C_6 alkylene group which may be substituted by a C_1–C_3 alkyl group, and R^1 is as defined above), —O—L—OH (wherein L is as defined above), —O—L—O—L—O—R^2 (wherein L is as defined above, and R^2 is a hydrogen atom, a C_1–C_6 alkyl group or a phenyl group which may be substituted by a C_1–C_3 alkyl group, a halogen atom, a nitro group or a C_1–C_3 alkoxy group), —O—L—R^3 (wherein L is as defined above, and R^3 is a phenyl group which may be substituted by a C_1–C_3 alkyl group, a halogen atom, a nitro group Or a C_1–C_3 alkoxy group), —O—M (wherein M is a 3- to 6-membered alicyclic group containing not more than two sulfur or oxygen atoms and formed by a linkage of from 1 to 4 carbon atoms), —O—L—M (wherein L and M are as defined above), —O—L—NR^4R^5 (wherein L is as defined above and each of R^4 and R^5 which may be the same or different is a hydrogen atom or a C_1–C_6 alkyl group, or R^4 and R^5 form a 6-membered ring together with the adjacent nitrogen atom), —O—L—$COOR^4$ (wherein L and R^4 are as defined above), —O—CH=CH—$COOR^4$ (wherein R^4 is as defined above), —O—L—CN (wherein L is as defined above), —O—L—C(O)—R^2 (wherein L and R^2 are as defined above), —O—L—$S(O)_n$—R^4 (wherein L and R^4 are as defined above, and n is an integer of from 0 to 2), —O—$COOR^4$ (wherein R^4 are as defined above), —O—$CONR^4R^5$ (wherein R^4 and R^5 are as defined above), —$OP(O)(OR^4)_2$ (wherein R^4 is as defined above), —$S(O)_nR^1$ (wherein R^1 and n are as defined above), or —$S(O)_n$—L—O—R^1 (wherein L, R^1 and n are as defined above);

Z is a halogen atom, a nitro group, a C_1–C_3 alkoxy group, a trifluoromethyl group, a trifluoromethoxy group, a cyano group or —$S(O)_nR^6$ (wherein n is as defined above, and R^6 is a C_1–C_3 alkyl group or a C_1–C_3 haloalkyl group);

V is a hydrogen atom, a halogen atom, a C_1–C_4 alkyl group or a C_1–C_4 alkoxy group;

W is a hydrogen atom, a halogen atom, a C_1–C_4 alkyl group, a C_1–C_4 haloalkyl group, a C_1–C_4 alkoxy group, a C_2–C_6 alkoxyalkyl group, a C_2–C_5 alkoxycarbonyl group, a

C_1–C_3 haloalkoxy group, a nitro group, a cyano group or —S(O)$_n$—R^6 (wherein n and R^6 are as defined above) and Q is a hydrogen atom, a C_1–C_6 alkyl group which may be substituted by a halogen atom, a C_1–C_6 alkenyl group which may be substituted by a halogen atom, a C_1–C_6 alkynyl group which may be substituted by a halogen atom, a cyanomethyl group, —C(O)—R^7 (wherein R^7 is a phenyl group which may be substituted by the same or different substituents selected from the group consisting of a C_1–C_6 alkyl group, a C_1–C_6 alkenyl group, a C_1–C_6 alkynyl group, a C_1–C_6 haloalkyl group, a C_1–C_6 haloalkenyl group, a C_1–C_6 haloalkynyl group, a halogen atom, a nitro group and a trifluoromethyl group, a C_1–C_6 alkyl group, a C_1–C_6 alkoxy group, or a hydroxyl group), —S(O)$_2R^7$ (wherein R^7 is as defined above), —P(O)-$(OR^7)_2$ (wherein R^7 is as defined above), —L—C(O)—R^7 (wherein L and R^7 are as defined above), —L—C-(O)—N(R^8)(R^9) (wherein L is as defined above, and each of R^8 and R^9 which may be the same or different is a hydrogen atom or a C_1–C_6 alkyl group), —L—R^{10} (wherein L is as defined above, and R^{10} is a phenyl group which may be substituted by the same or different substituents selected from the group consisting of a halogen atom, a nitro group and a trifluoromethyl group, a C_1–C_6 alkyl group, a C_1–C_6 alkoxy group, or a hydroxyl group), —L—N(R^8)(R^9) (wherein L, R^8 and R^9 are as defined above), —L—OR^{11} (wherein L is as defined above, and R^{11} is a hydrogen atom, a C_1–C_6 alkyl group, or a C_1–C_6 alkenyl group), —L—OC(O)R^{12} (wherein L is as defined above, and R^{12} is a C_1–C_6 alkyl group or a C_1–C_6 alkoxy group), —L—S(O)$_nR^{11}$ (wherein L, n and R^{11} are as defined above), —L—SC(O)R^8 (wherein L and R^8 are as defined above),



(wherein each of L1 and L2 which may be the same or different is a methylene group, an oxygen atom or a sulfur atom, R^{12} is a hydrogen atom or a C_1–C_3 alkyl group, and m is 2 or 3); and a salt thereof.

3. A selective herbicidal composition comprising a herbicidally effective amount of a pyrazole derivative of the formula I as defined in claim 1 or its salt and an agricultural carrier or diluent.

4,986,846

2-(4,6-DIMETHOXY-2-PYRIMIDINYLOXY)BENZALDOXIMES, PREPARATION PROCESSES THEREOF, HERBICIDES CONTAINING THE SAME, AND HERBICIDAL COMPOSITIONS CONTAINING THE SAME ALONG WITH OTHER ACTIVE INGREDIENT

Masatoshi Gohbara; Tamotsu Asano; Shuji Ozawa; Hideo Yamazaki; Tsutomu Ishii; Makoto Nishida, all of Kanagawa; Junko Watanabe, Tokyo, and Naoki Sato, Fukuoka, all of Japan, assignors to Mitsui Toatsu Chemicals, Incorporated, Tokyo, Japan

Filed Dec. 18, 1989, Ser. No. 451,678

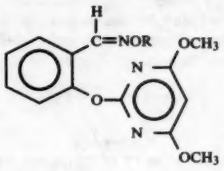
Claims priority, application Japan, Dec. 19, 1988, 63-318484

Int. Cl.[5] A01N *43/54;* **C07D** *239/60*

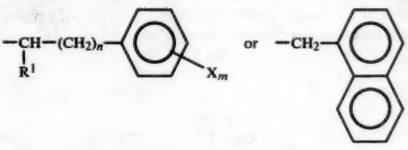
U.S. Cl. 71—92 **19 Claims**

1. A 2-(4,6-dimethoxy-2-pyrimidinyloxy)benzaldoxime.

2. A 2-(4,6-dimethoxy-2-pyrimidinyloxy)benzaldoxime represented by the following formula:



wherein R represents a hydrogen atom; a lower alkyl, lower alkenyl, lower alkynyl, phenyl-substiututed lower alkenyl, lower haloalkenyl, cycloalkyl of 3 to 6 ring carbon atoms, substituted phenyl-lower alkenyl wherein the phenyl group bears one or more alkyl, alkoxy and trifluoromethyl groups or halogen atoms or phenyl-substituted lower alkynyl group; or a group represented by the following formula:



wherein R^1 represents a hydrogen atom or a lower alkyl group, X a halogen atom or a lower alkyl or lower alkoxyl group, m and n individually 0–2, and when m is 2, both Xs may be the same or different.

11. A herbicide composition comprising as herbicidally active ingredient, in admixture with a carrier, a 2-(4,6-dimethoxy-2-pyrimidinyloxy)benzaldoxime of claim 2.

4,986,847

PROCESS AND APPARATUS FOR AT LEAST TEMPORARILY SIMULTANEOUSLY SUBJECTING A MOLTEN METAL TO THE ACTION OF A GAS AND FINE-GRAIN SOLID MATERIALS

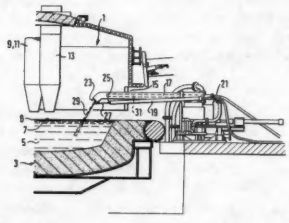
Hubert Knapp, Bühl, and Peter Hoffmann, Schwelm, both of Fed. Rep. of Germany, assignors to Fuchs Systemtechnik GmbH, Willstatt-Legelshurst and GFI Gesellschaft für Industrieausrüstung mbH, Schwelm, both of, Fed. Rep. of Germany

Filed Nov. 22, 1989, Ser. No. 440,517

Claims priority, application Fed. Rep. of Germany, Sep. 20, 1989, 3931392

Int. Cl.[5] C21C *7/00*

U.S. Cl. 75—525 **20 Claims**



1. A process for subjecting molten metal in a metallurgical vessel having a first lance with a first outlet opening and a second lance with a second outlet opening, to the action of a gas and to fine-grain solid material, comprising the steps of: supplying the gas to said vessel from said first lance with a first velocity conveying said fine-grain solid material into said

vessel by a fluid conveyor stream from said second lance with a second velocity lower than said first velocity, in such a way that said material after leaving said second outlet opening is deflected by the gas from said first outlet opening and supplied by said gas to the molten metal.

4,986,848

CATALYST FOR ELECTROLESS PLATING

Hiroshi Yamamoto, Yuki; Takeshi Shimazaki, Hitachi, and Kazuichi Kuramochi, Shimodate, all of Japan, assignors to Hitachi Chemical Company, Ltd., Tokyo, Japan

Filed Jan. 19, 1989, Ser. No. 298,967

Claims priority, application Japan, Jan. 28, 1988, 63-18132; May 6, 1988, 63-110862

Int. Cl.[5] C23C *18/08*

U.S. Cl. 106—1.11 12 Claims

1. A catalyst aqueous solution for electroless plating comprising one mole of divalent palladium compound, 1 to 20 moles of a lower alkylamine and 0.5 to 10 moles of aminopyridine, said aqueous solution having a pH of 9.0 to 14.

4,986,849

SILVER-GLASS PASTES

My N. Nguyen, San Diego; Julie H. Wood, Encinnetas, and Thomas L. Herrington, Ramona, all of Calif., assignors to Johnson Matthey Inc., Valley Forge, Pa.

Filed Sep. 23, 1988, Ser. No. 248,120

Int. Cl.[5] B05B *00/00*

U.S. Cl. 106—1.14 4 Claims

1. In a silver-glass paste consisting essentially of silver flake, lead borate glass frit, resin and organic vehicle, the improvement which comprises including a surfactant, in an amount of from 0.05–2% by weight of the paste and sufficient to stabilize the paste, said surfactant being stable at a temperature above about 300° C. and being one which comprises a lyophobic hydrocarbon or hydrocarbonoxy group and an ionic or highly polar lyophilic group.

4,986,850

RECORDING LIQUID:WATER COMPOSITION WITH 25 CP MINIMUM VISCOSITY AT 9:1 BLEND AND 15 CP MAXIMUM VISCOSITY AT 1:1 BLEND

Kazuo Iwata, Yokohama; Shinichi Tochihara, Hiratsuka, and Shoji Koike, Yokohama, all of Japan, assignors to Canon Kabushiki Kaisha, Tokyo, Japan

Continuation of Ser. No. 208,797, Jun. 20, 1988, abandoned, which is a continuation of Ser. No. 884,082, Jul. 10, 1986, abandoned. This application Sep. 5, 1989, Ser. No. 403,891

Claims priority, application Japan, Jul. 15, 1985, 60-155712

Int. Cl.[5] C09D *11/14*

U.S. Cl. 106—25 5 Claims

1. A recording liquid composition comprising: (a) a recording agent, (b) a water-soluble organic solvent present in an amount from 5 to 50% by weight of the total recording liquid composition, (c) an alkylene oxide adduct of polyhydric alcohol, where the polyhydric alcohol is selected from the group consisting of glycerine, hexose, the sugar-alcohol of hexose, pentose, the sugar alcohol of pentose, and oligosaccharide, said alkylene oxide adduct being present in an amount from 0.05 to 4% by weight of the total weight of the recording liquid composition, and (d) water, wherein said composition is regulated to give a viscosity of 25 cp or higher at a blending ratio of the recording agent-organic solvent mixture to water of 9:1 by weight at 25° C., and to give a viscosity of 15 cp or lower at a blending ratio of 1:1 by weight at 25° C.

4,986,851

PIGMENT DISPERSIONS, PROCESSES FOR THEIR PREPARATION AND THEIR USE

Erwin Dietz, Kelkheim; Albert Münkel, and Ferdinand Memmel, both of Frankfurt am Main, all of Fed. Rep. of Germany, assignors to Hoechst Aktiengesellschaft, Frankfurt, Fed. Rep. of Germany

Continuation of Ser. No. 81,833, Aug. 5, 1987, abandoned. This application Mar. 22, 1989, Ser. No. 327,332

Claims priority, application Fed. Rep. of Germany, Aug. 9, 1986, 3627023

Int. Cl.[5] C08K *5/42, 5/51;* C09D *11/00*

U.S. Cl. 106—503 14 Claims

1. A pigment dispersion consisting of

(A) 10 to 80% by weight of a pigment,

(B) 2 to 20% by weight of one or more alkylglycol ether-sulfates of the formula (I)

$$R^1—O—(CH_2CH_2—O—)_mSO_3M \quad (I)$$

in which

R^1 represents an alyl or alkenyl radical with 6 to 28 carbon atoms,

m represents an integer from 1 to 20 and

M represents a physiologically acceptable cation,

(C) 0.1 to 10% by weight of one or more phosphoric acid esters of the formula (II)

$$[R^2—O—(CH_2CH_2—O—)_n]_pP(=O)—(OH)_{3-p} \quad (II)$$

in which

the radicals R^2 independently of one another represent an alkyl or alkenyl radical with 4 to 28 carbon atoms,

the symbols n independently of one another represent an integer from 0 to 10 and

p represents an integer from 1 to 3,

(D) 3 to 60% by weight of a physiologically acceptable sugar-alcohol water retention agent, including glycerol,

(E) 0 to 5% by weight of customary additives selected from the group consisting of preservatives, and antisettling and wetting agents, and

(F) 0 to 80% by weight of water,

the sum of the constituents (A), (B), (C), (D), (E) and (F) present making up 100% by weight of the dispersion.

4,986,852

PIGMENTS AND USE THEREOF

Erwin Dietz, Kelkheim; Gustav Kapaun, Bad Soden am Taunus; Michael Kappert, Kelkheim; Frank Prokschy, Frankfurt am Main; Adolf Kroh, Selters, and Manfred Urban, Wiesbaden, all of Fed. Rep. of Germany, assignors to Hoechst Aktiengesellschaft, Frankfurt am Main, Fed. Rep. of Germany

Filed Dec. 20, 1988, Ser. No. 286,894

Claims priority, application Fed. Rep. of Germany, Dec. 22, 1987, 3743619; Nov. 17, 1988, 3838814

Int. Cl.[5] C08K *5/04, 5/16, 5/34, 5/36*

U.S. Cl. 106—498 5 Claims

1. A pigment of the general formula I

$$P—(CH_2—\underset{\displaystyle R_3}{\overset{\displaystyle R_1}{A}}—R_2)_n \quad (I)$$

where A is a five- or six-membered aromatic fused or unfused heterocycle which contains one to three hetero atoms selected from the group consisting of nitrogen, oxygen, sulfur and combinations thereof and which is bonded to the methylene group via a carbon atom, R_1 and R_2 are each hydrogen, alkyl C_1–C_4, alkylene C_2 or aryl, and together R_1 and R_2 may also be

an aliphatic or aromatic ring, R_3 is hydrogen, alkyl C_1–C_4, hydroxyalkyl C_1–C_3, or alkylene C_2 with alkyl being linear or branched, P is the radical of a polycyclic pigment, or a radical of a mix-crystal of polycyclic pigments and n is a number from 0.001 to 0.2.

4,986,853

PEARLESCENT PIGMENT PREPARATIONS

Manfred Kieser, Darmstadt, Fed. Rep. of Germany, assignor to Merck Patent Gesellschaft Mit Beschrankter Haftung, Darmstadt, Fed. Rep. of Germany

Filed Apr. 11, 1988, Ser. No. 179,830

Claims priority, application Fed. Rep. of Germany, Apr. 10, 1987, 3712289

Int. Cl.[5] C09C *3/08*; C08K *5/09*

U.S. Cl. 106—504 16 Claims

1. Pulverulent pearlescent pigment particles having improved flowability, comprising a pearlescent pigment coated with 1–5% of a saturated C_{10-26}-monocarboxylic acid in the free acid form or as an alkali or ammonium salt effective to improve flowability.

4,986,854

METHOD OF IMPROVING QUALITY OF MORTAR OR CONCRETE STRUCTURES AND ADDITIVES THEREFOR

Masahiko Okuno, Kobe, and Yoshitaka Kanayama, Moriguchi, both of Japan, assignors to Merbabu Corporation, Osaka, Japan

Filed Aug. 30, 1989, Ser. No. 400,807

Claims priority, application Japan, Sep. 5, 1988, 63-222148; May 31, 1989, 1-139486

Int. Cl.[5] C04B *26/18*

U.S. Cl. 106—665 11 Claims

2. A method of improving the quality of a structure to be prepared from mortar or concrete, wherein the quality relates to prevention of efflucrescence, inhibition of neutralization, inhibition of drying shrinkage and inhibition of corrosion of reinforcements, the method being characterized in that when the mortar or concrete is kneaded, a water-soluble amino resin selected from the group consisting of water-soluble urea resin, water-soluble melamine resin and water-soluble urea-melamine resin, and at least one of a higher fatty acid metal salt and a nonionic surfactant are admixed therewith, wherein about 0.2 to about 1.5 parts by weight of the water-soluble amino resin (calculated as dry solids), and additionally about 0.02 to about 0.1 parts by weight of the higher fatty acid metal salt and/or about 0.004 to about 0.08 parts by weight of the nonionic surfactant are used per 100 parts by weight of cement.

4,986,855

PRODUCT AND PROCESS FOR PREPARATION THEREOF

Roy E. Sterling, Edmonton, Canada, assignor to 501 Alberta Honey Producers Co-operative Limited, Edmonton, Canada

Filed Oct. 5, 1989, Ser. No. 417,714

Int. Cl.[5] C13F *1/02*

U.S. Cl. 127—60 25 Claims

1. A process for the preparation of a honey product, said process comprising:

adding a quantity of seed honey to a mass of honey while maintaining said mass of honey below the melting point of said seed honey and above the temperature at which hard granulation would occur prematurely;

allowing the resulting mass of honey to begin crystallization;

treating the mass of honey a first time to physically break up existing and forming crystal groups;

holding the mass of honey a first time for a predetermined period sufficient to allow crystallization of the honey;

treating the resulting honey at least one additional time to physically break up crystal groups; and

holding said honey a second time for a period sufficient to stabilize the resulting honey.

4,986,856

FINE COPPER WIRE FOR ELECTRONIC INSTRUMENTS AND METHOD OF MANUFACTURING THE SAME

Toru Tanigawa; Masaaki Kurihara, both of Nikko; Yasuji Fujii, Yokohama, and Toshiaki Inaba, Hiratsuka, all of Japan, assignors to The Furukawa Electric Co., Ltd., Tokyo and Furukawa Special Metal Co., Ltd., Hiratsuka, both of, Japan

Continuation of Ser. No. 209,212, Jun. 20, 1988, abandoned.

This application Sep. 14, 1989, Ser. No. 408,423

Claims priority, application Japan, Jun. 25, 1987, 62-158482

Int. Cl.[5] C22C *9/00*

U.S. Cl. 148—11.5 C 4 Claims

1. A method of manufacturing fine copper wire for electronic instruments, said wire comprising an alloy comprising 0.05–10 ppm in total amount of one or more of Ti, Zr, V, Hf, Cr, Ca, Mg, Y and rare-earth elements, 1–30 ppm of Oxygen and the remainder of Cu, which process comprises:

(a) melting and casting said alloy in a non-oxidative atmosphere or in a vacuum to form an ingot,

(b) hot rolling said ingot,

(c) drawing said ingot and subjecting the drawn ingot to at least one intermediate annealing to form a fixed diameter of wire, and

(d) annealing said wire under a non-oxidative or reducible atmosphere.

4,986,857

HOT WORKING AND HEAT TREATMENT OF CORROSION RESISTANT STEELS

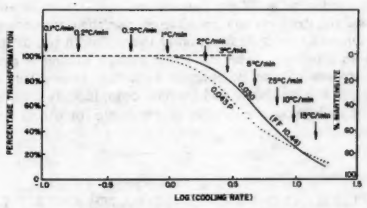
Jack Hewitt, Middelburg, South Africa, assignor to Middelburg Steel and Alloys (Proprietary) Limited, Transvaal Province, South Africa

Filed May 12, 1989, Ser. No. 351,435

Claims priority, application South Africa, May 19, 1988, 88/3551

Int. Cl.[5] C21D *8/00*

U.S. Cl. 148—12 EA 24 Claims



1. A method of producing a body in coil form of corrosion resistant steel comprising the steps of

(a) selecting a corrosion resistant steel having

(1) an austenite to ferrite and carbide transformation temperature (A3) between 650° C. and 850° C. and

(2) a composition resulting in a steel having the substantial absence of martensite microstructure at cooling rates lower than 5 degrees C. per minute;

(b) hot working the steel body at above the A3 transformation temperature; and,

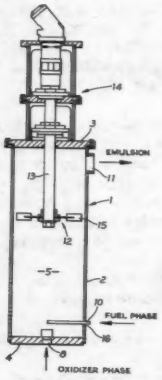
(c) without cooling and reheating in an annealing furnace, cooling the hot worked steel body to below the transformation temperature at a cooling rate of between 10 degrees C. per minute and 1 degree C. per minute determined to ensure substantial absence of martensite microstructure throughout the body.

4,986,858

EMULSIFICATION METHOD

Raymond Oliver, Cleveland, England; Jeremy G. B. Smith, and Fortunato Villamagna, both of Quebec, Canada, assignors to Imperial Chemical Industries PLC, London, England

Filed Jun. 18, 1990, Ser. No. 539,487
Claims priority, application United Kingdom, Jun. 16, 1989, 8913871; Jun. 23, 1989, 8914507
Int. Cl.[5] C06G *45/00*
U.S. Cl. 149—109.6 13 Claims



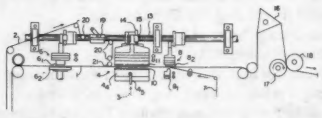
1. A method for the continuous production of an oil/water emulsion explosive composition, comprising simultaneously and continuously introducing into a mixing chamber separate liquid streams of a continuous phase component and a immiscible discontinuous phase component, the immiscible discontinuous phase component being introduced into the continuous phase through turbulence inducing means which constricts the flow of the immiscible discontinuous phase such as to cause its spontaneous disruption to form fine droplets of a desired size upon its emergence into the mixing chamber, the turbulence inducing means further causing the immiscible discontinuous phase to emerge in a flow pattern and at a flow rate sufficient to cause the droplets so formed to entrain the continuous phase component to provide for mixing thereof with the droplets to form an emulsion, wherein shear mixing means is provided downstream of the turbulence inducing means for further mixing of the emulsion, and thereby continuously form a more refined or homogeneous emulsion suitable for use as the basis for an explosive system.

4,986,859

METHOD AND A DEVICE TO PASTE A STRIP TAPE ONTO A PACKAGING WEB EQUIPPED WITH A LIQUID POURING HOLE

Masashi Watanabe, Yokohama, Japan, assignor to AB Tetra Pak, Lund, Sweden

Filed Nov. 6, 1989, Ser. No. 432,060
Claims priority, application Japan, Nov. 7, 1988, 63-280876
Int. Cl.[5] B32B *31/12*
U.S. Cl. 156—69 4 Claims



1. A method to paste a strip tape onto a packaging web equipped with a liquid pouring hole in which a strip tape is pasted onto a packaging web between a flat heating element and a freely pressible pressure rail provided over and below a conveyance path of a packaging web conveyed intermittently, by pressing said strip tape onto said packaging web and closing a previously made punch hole, wherein air is blown in a direction opposite to a direction in which said strip tape is adhered to an area of said strip tape that closes said punch hole by overlapping on the packaging web surface, so that said strip tape at said area is loosened and deposited onto the packaging web when said strip tape is being pasted to said web.

4,986,860

METHOD FOR PRODUCING A LAMINATED MATERIAL

Hirofumi Akimoto; Sadayuki Takeyama; Toshimichi Hiki, and Masayuki Kondo, all of Hamamatsu, Japan, assignors to Kyowa Leather Cloth Co., Ltd., Japan

Filed Sep. 13, 1988, Ser. No. 243,997
Claims priority, application Japan, Sep. 18, 1987, 62-234125
Int. Cl.[5] B32B *5/18*
U.S. Cl. 156—78 24 Claims

1. A method for producing a laminated material comprising a lower layer and a surface layer of thermoplastic resin sheet laminated on an upper surface of said lower layer,

wherein said lower layer is mainly comprised of highly-expanded plasticized polyvinyl chloride with cross-linking, said lower layer comprising (A) a polyvinyl chloride resin having reacting groups, or (B) a mixture of a polyvinyl chloride resin having no reacting groups and a thermoplastic resin having reacting groups,

said method comprising:

heating and kneading raw materials for the lower layer in an extruder, said raw materials excluding a cross-linking agent and a blowing agent;

adding the cross-linking agent and the blowing agent;

heating and kneading the obtained material at a temperature lower than a reacting temperature of the cross-linking agent and a decomposition temperature of the blowing agent to obtain a sheet;

heating the sheet without application of electron rays to cross-link and expand the sheet to form the lower layer mainly comprising cross-linked highly-expanded plasticized polyvinyl chloride; and

laminating the surface layer of the thermoplastic resin on the upper surface of the lower layer.

4,986,861

SEMICONDUCTOR PRESSURE SENSOR AND METHOD FOR BONDING SEMICONDUCTOR CHIP TO METAL DIAPHRAGM THEREOF

Minoru Nishida, Okazaki; Naohito Mizuno, Nishio; Tadashi Hattori, Okazaki; Seizi Huzino, Anjo, and Yoshiyasu Ando, Nishio, all of Japan, assignors to Nippon Soken, Inc., Nishio, Japan

Division of Ser. No. 50,031, May 15, 1987, Pat. No. 4,840,067.
This application Mar. 13, 1989, Ser. No. 322,561
Claims priority, application Japan, Jun. 13, 1986, 61-138731
Int. Cl.[5] B32B *31/04*
U.S. Cl. 156—89 9 Claims

1. A method for bonding a semiconductor chip to a metal diaphragm, comprising the steps of:

acid pickling a surface of said metal diaphragm to form a deoxidized surface;

decarburizing said deoxidized surface;

oxidizing said decarburized surface;

placing a glass paste on said oxidized surface and calcining said glass paste to form a glass layer; and

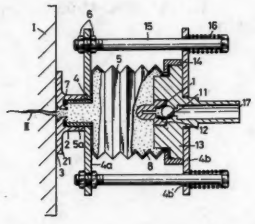
placing said semiconductor chip on said glass layer and sintering said semiconductor chip and said glass layer to bond said chip to said glass layer.

4,986,862

SEALANT INJECTION METHOD AND AN APPARATUS THEREFOR

Takayoshi Matsufuru, Hiroshima, Japan, assignor to AOI Chemical Inc., Japan

Filed Nov. 9, 1989, Ser. No. 434,038
Claims priority, application Japan, Nov. 9, 1988, 63-283092
Int. Cl.[5] B32B *35/00*
U.S. Cl. 156—94 **8 Claims**



1. Sealant injection method for injecting adhesive into cracks of a structure comprising the steps of:

fastening the base of an injection pipe by adhesive on one part of a crack occurring in a structure,

sealing the other part of the crack uncovered by the base,

connecting a bellows-like injection container capable of expansion and contraction to the injection pipe, and

injecting the sealant through a check valve into the crack by compressing the container with a resilient member.

4,986,863

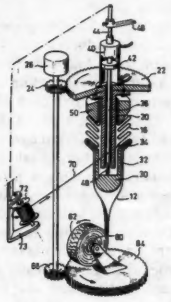
PROCESS FOR PRODUCING A LAMINATED TUBULAR FIBROUS STRUCTURE FOR USE AS REINFORCING STRUCTURE FOR A COMPOSITE PIECE

Jean D. Denoel, Talence; Michel C. Vives, Eysines, and Christian Bertone, Castelnau de Medoc, all of France, assignors to Societe Europeenne De Propulsion, France

Continuation-in-part of Ser. No. 224,742, Jul. 27, 1988, Pat. No. 4,891,083, which is a division of Ser. No. 35,659, Mar. 26, 1987, Pat. No. 4,780,346. This application Sep. 28, 1988, Ser. No. 253,223
Claims priority, application France, Sep. 28, 1987, 87 13387
Int. Cl.[5] B65H *81/00*
U.S. Cl. 156—194 **10 Claims**

1. A process for the production of a laminated tubular fibrous structure comprising layers of fibrous material which are superposed in an axial direction, each one extending from an inside surface to an outside surface of the structure, said process comprising the steps of:

providing a tubular braid made of fibrous material and progressively folding over the wall of the tubular braid to form corrugations or wrinkles therein; and



superposing said corrugations or wrinkles successively upon one another, which corrugations and wrinkles constitute said layers of fibrous material,

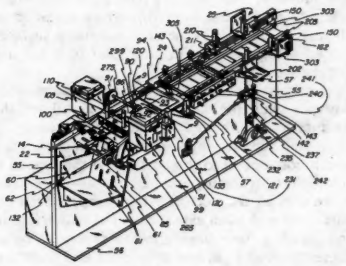
wherein said progressive folding of the tubular braid and said successive superposing of the corrugations or wrinkles formed thereby take place simultaneously.

4,986,864

PAGE BINDING METHOD AND MACHINE

Frederick L. Heim; Mark Becker, both of St. Cloud; Craig A. Dullinger, Avon; Edward J. Gnifkowski, Sauk Rapids; Roger M. Gohl, Clear Lake, and John D. Weber, St. Cloud, all of Minn., assignors to Webway Incorporated, St. Cloud, Minn.

Filed Apr. 5, 1989, Ser. No. 333,518
Int. Cl.[5] B32B *31/18*
U.S. Cl. 156—201 **19 Claims**



1. Apparatus for manufacturing, on an automatic continuous basis, successive album pages of predetermined length and width each of which comprises a base sheet having a reinforcing tape bound thereto in overlapping relation with each side edge thereof, comprising:

(a) means defining a page assembling station,

(b) source means for two tapes to be supplied to said assembling station,

(c) means forming a sheet supply station for holding a plurality of sheets to be bound with said tapes,

(d) means upstream from said assembling station for applying adhesive to one surface of each of said tapes,

(e) means for guiding said two adhesive tapes to said assembling station in proper laterally spaced relation to receive one of said sheets therebetween,

(f) first feeding means for advancing one of said sheets lengthwise from said sheet supply station into engagement with said tapes at said assembling station,

(g) second feeding means for drawing said advanced sheet and said tapes through said assembling station and thereby drawing additional lengths of said tapes toward said assembling station,

(h) said assembling station including means for folding said tapes into overlapping adhered relation with the respective side edges of said advanced sheet as said tapes and sheet travel through said assembling station,

(i) means for causing recycling of both of said feeding means to form a web comprising a plurality of successive said sheets connected with each other by said tapes,

(j) means for limiting the action of said feeding means to an incremental distance providing a predetermined margin between adjacent said sheets in said web, and

(k) means downstream from said assembling station defining a cut-off station and including means for severing said tapes between the one said sheet at the downstream end of said web and the adjacent said sheet upstream thereof in said web in timed relation with said recycling means.

4,986,865

METHOD OF PRODUCING TRIM BOARD

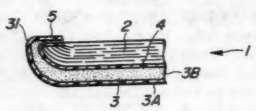
Masanobu Fujii, Gifu, Japan, assignor to Ikeda Bussan Co., Ltd, Ayase, Japan

Filed Nov. 17, 1989, Ser. No. 437,609

Claims priority, application Japan, Mar. 22, 1989, 1-71057

Int. Cl.[5] B32B *31/18*

U.S. Cl. 156—214 **6 Claims**



1. A method of producing a trim board, comprising by steps:

(a) hot-pressing, trimming and piercing a resin-impregnated substrate at the same time to produce a shaped substrate;

(b) laying an outer skin member onto one surface of said shaped substrate with an interposal of a hot-melt sheet therebetween;

(c) pressing said outer skin member against said shaped substrate while the shaped substrate is still hot, thereby to produce a skin covered unfinished trim board;

(d) trimming and piercing said outer skin member at portions which correspond to the portions of the shaped substrate at which the trimming and piercing have been carried out at the step (a), the step (d) being so made that a peripheral portion of said outer skin member at which said trimming and piercing have been effected protrudes by a certain degree beyond a peripheral edge of said shaped substrate at which said trimming and piercing have been effected; and

(e) turning back the protruding peripheral portion of said outer skin member and fixing the same to a peripheral back portion of said shaped substrate.

4,986,866

PROCESS FOR PRODUCING SYNTHETIC LABEL PAPER

Yozo Ohba; Masaaki Yamanaka; Moriyasu Sudo, and Akira Iwai, all of Ibaraki, Japan, assignors to Oji Yuka Goseishi Co., Ltd., Tokyo, Japan

Filed Dec. 15, 1989, Ser. No. 451,007

Int. Cl.[5] B32B *31/20*

U.S. Cl. 156—220 **5 Claims**

1. A process for producing synthetic label paper which comprises preparing a multi-layer film comprising a film of a thermoplastic resin containing an inorganic fine powder having provided on the back side thereof a layer of a heat-sealable resin having a melting point lower than that of said thermoplastic resin, embossing the heat-sealable resin layer, and stretching the embossed multi-layer film at a temperature of from the melting point of said heat-sealable resin to a temperature lower than the melting point of said thermoplastic resin.

4,986,867

METHOD OF MANUFACTURING A PREFABRICATED VEHICLE WINDOW

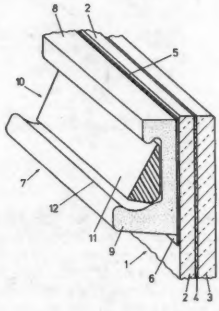
Jürg G. Braendle, Baech, and Wolfgang Saur, Buttikon, both of Switzerland, assignors to Gurit-Essex AG, Freienbach, Switzerland

Division of Ser. No. 255,641, Oct. 11, 1988, Pat. No. 4,879,853. This application Jul. 27, 1989, Ser. No. 386,289

Claims priority, application Switzerland, Oct. 14, 1987, 4026/87; Apr. 20, 1988, 1497/88

Int. Cl.[5] B29C *47/06*

U.S. Cl. 156—244.11 **20 Claims**



1. A method of producing a prefabricated vehicle window adapted to be directly glued into a vehicle body, comprising the steps of

providing a window having an edge;

extruding a first bead of adhesive material having an essentially U-shaped cross section forming a recess;

depositing said first bead of adhesive material along the edge of said window;

curing said first bead of adhesive material when it is deposited on said window;

providing a second bead of adhesive material which is chemically compatible with respect to the adhesive material of said first bead; and

depositing said second bead of adhesive material in the interior of the recess of said first bead;

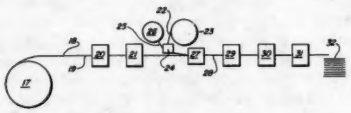
the depositing and the curing of said first bead and the depositing of said second bead in the interior of the recess of said first bead being performed separately from mounting of the vehicle window into the vehicle body.

4,986,868

METHOD OF MAKING AN INTERMEDIATE BLANK FOR IDENTIFICATION CARD OR THE LIKE

Eric Schmidt, Elgin, Ill., assignor to Wallace Computer Services, Inc., Hillside, Ill.

Continuation of Ser. No. 238,576, Aug. 31, 1988, abandoned. This application Oct. 17, 1989, Ser. No. 423,734
Int. Cl.[5] B32B *31/00*
U.S. Cl. 156—249 6 Claims



1. A method for preparing a series of connected intermediate blanks for identification cards or the like comprising:

advancing a base stock web along a predetermined path;

providing a composite web including a transparent layer, a release liner layer, and a pressure sensitive adhesive disposed between the transparent and release liner layers;

removing a predetermined width of the release liner layer along one edge of the composite web to expose the pressure sensitive adhesive between the removed portion of the release liner layer and the transparent layer;

introducing the composite web into said path in overlapping relation with the base stock web, said base stock web being disposed in side-by-side relation with the remaining portion of the release liner layer; and

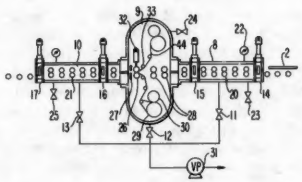
pressing said composite web and base stock web together to bond the webs together to provide said connected series.

4,986,869

METHOD EMPLOYING INPUT AND OUTPUT STAGING CHAMBER DEVICES FOR REDUCED PRESSURE LAMINATION

Yoshiaki Tomisawa; Tadaji Satou; Nobuyuki Hayashi, and Yusuke Miyamae, all of Hitachi, Japan, assignors to Hitachi Chemical Co., Ltd., Tokyo, Japan

Division of Ser. No. 899,642, Aug. 25, 1986. This application Feb. 9, 1989, Ser. No. 307,937
Claims priority, application Japan, Aug. 30, 1985, 60-192789
Int. Cl.[5] B32B *31/10*
U.S. Cl. 156—250 5 Claims



1. A method of laminating a light senstive material in a film form and a printed circuit base board together under vacuum in an evacuated first chamber space of a reduced pressure adhesion device which further comprises a second chamber space adapted to be selectively connected to or disconnected from said first chamber space on a first side thereof by a first gate valve and a third chamber spaced adapted to be connected to or disconnected from said first chamber space on a second side thereof substantially opposite to said first side by a second gate valve, comprising the steps of:

charging said printed cirucit base board into said second chamber space under atmospheric pressure while said second chamber space is disconnected from said first chamber space by said first gate valve;

evacuating said second chamber space to be substantially in a same evacuated condition as said first chamber space;

connecting said second chamber space to said first chamber space by opening said first gate valve;

transferrng said printed circuit base board from said second chamber space to said first chamber space;

continuing transfer of said printed circuit base board in said first chamber space while preheating said printed circuit base board and laminating said light sensitive material which is supplied from a continuous source thereof provided in said first chamber space onto said printed circuit base board under application of a force for pressing said light sensitive material and said printed circuit base board to one another to form a tightly laminated material of said light sensitive material and said printed circuit base board;

evacuating said third chamber space to be substantially in a same evacuated condition as said first chamber space;

connecting said third chamber space to said first chamber space by opening said second gate valve;

transferring said laminated material from said first chamber space to said third chmaber space while cuting said light sensitive material laminated on said printed circuit base board off from a remaining continuous source thereof;

disconnecting said third chamber space from said first chamber space by said second gate valve;

removing the evacuated condition of said third chamber space; and

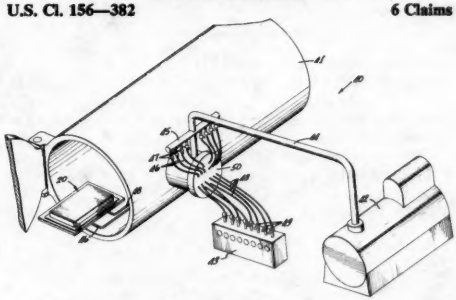
discharging said laminated material from said third chamber space under atmospheric pressure.

4,986,870

APPARATUS FOR LAMINATING MULTILAYERED PRINTED CIRCUIT BOARDS HAVING BOTH RIGID AND FLEXIBLE PORTIONS

Sigurd Frohlich, Santa Barbara, Calif., assignor to R.W.Q., Inc., Irvine, Calif.

Continuation of Ser. No. 587,928, Mar. 9, 1984, abandoned. This application Sep. 27, 1985, Ser. No. 781,313
Int. Cl.[5] B32B *31/00*
U.S. Cl. 156—382 6 Claims



1. A portable module for laminating multilayers of a multilayer printed circuit board comprising:

a vacuum plate having a vacuum port and a vacuum line connector on one side thereof;

bleeder plate means positioned on the other side of said vacuum plate for providing multiple channels for air flow to uniformly from said vacuum port to the perimeter of said means;

a lower lamination plate positioned on said bleeder plate means, the multilayers of said printed circuit board being adapted to be positioned on said lower lamination plate;

a blanket of porous material covering said printed circuit board, said lower lamination plate and said bleeder plate means; and

a vacuum bag covering said blanket of porous material and hermetically sealed to said vacuum plate, said blanket and

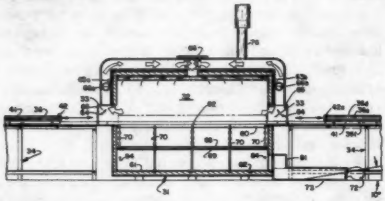
said vacuum bag conformable to the shape of the printed circuit board, the lower lamination plate and said bleeder plate means.

4,986,871

APPARATUS FOR MAKING HONEYCOMB-LIKE PANELING

Robert H. Leslie, Edina, Minn., assignor to Panel Technology, Inc., Minneapolis, Minn.

Filed Jun. 30, 1988, Ser. No. 214,024
Int. Cl.[5] B32B *3/12*
U.S. Cl. 156—494 12 Claims



1. An expanding and curling apparatus used in expanding and curing honeycomb panels, comprising:

adjustable expansion table means for expanding honeycomb panels of varying sized and thicknesses, the expansion table means comprising a horizontally movable top portion supporting the honeycomb panels;

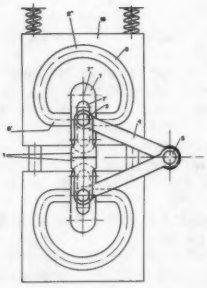
curing chamber means for curing expanded honeycomb panels at a substantially uniform temperature, pressure, and air circulation during the curing process, the curing chamber means being adjacent the expansion table means, so that the horizontally movable top portion rolls with the expanded honeycomb panel into the curing chamber means, the curing chamber means including support means for supporting the horizontally movable top portion inside the curing chamber means during the curing process.

4,986,872

DEVICE FOR SEALING ENVELOPES AND THE LIKE MADE OF PLASTIC MATERIAL

Pietro Fioravanti, Schio, Italy, assignor to P.F.M. S.p.A., Torrebelvicini, Italy

Filed Aug. 15, 1989, Ser. No. 394,354
Claims priority, application Italy, Dec. 9, 1988, 85673 A/88
Int. Cl.[5] B32B *31/18*
U.S. Cl. 156—515 4 Claims



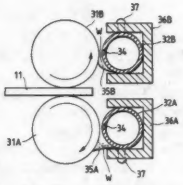
1. A device for sealing an envelope of plastic material which comprises two paddles (1) having parallel axes rotating in the opposite direction and synchronously, said paddles traveling on an eccentric trajectory, said device having two lateral heads, a support (18) disposed corresponding to each of said heads, and corresponding to both paddles a cam track (8), formed in said support, means connected with said paddles sliding within said cam track, said cam track having a rectilinear section, the extremities of which are connected by a circumferential sector, a supporting bar (3) connected to each of the two paddles, said supporting bar being placed in motion at its extremities by a pair of connecting rods (7), said connecting rods having a slit (7'), the said bar having portions close to its extremities, said portions being seated in said slits (7'), the extremities of the bar (3) being disposed within the said cam track (8), said connecting rods (7) being placed in motion so as to rotate in a synchronous manner, the connecting rods of each of the pair placed corresponding to each of the paddles rotating in the direction opposite with respect to the direction of the other pair, means for avoiding inconsistent motion of the paddles in the area in which the motion of the paddles is rectilinear, said means comprising two pairs of arms (4) disposed at the extremities of the bars (3), the arms disposed on the same side of the device converging in a common pin (5) disposed on the axis of the symmetry of the device and lying on a plane corresponding to the plane of operation of the paddles.

4,986,873

THIN-FILM COATING APPARATUS

Fumio Hamamura, Kanagawa, Japan, assignor to Somar Corporation, Tokyo, Japan

Filed Jan. 30, 1989, Ser. No. 302,884
Claims priority, application Japan, Jan. 30, 1988, 63-20013
Int. Cl.[5] B32B *31/10*
U.S. Cl. 156—552 2 Claims



1. A thin-film coating apparatus in which tack members are moved respectively close to opposite surfaces of a conveyance-direction forward end portion of an insulating substrate to temporarily tack feeding-direction forward end portions of thin films thereto, compression roller are placed against the forward end portions of the tacked thin films in the tacking position after said tack members are respectively removed from the surfaces of the substrate, and said compression rollers are rotated to convey said substrate and stick the thin films to the surfaces of the substrate, characterized in that said apparatus comprises:

wet rollers, each having a longitudinal axis and being arranged at a position prior to the tacking position to which said substrate is to be conveyed, for the purpose of depositing a void preventing agent to said substrate;

void preventing agent supply pipes arranged in parallel to the longitudinal axis of and proximate to said wet rollers;

flexible dams arranged under said void preventing agent supply pipes, one end of each of said dams being in contact with lower portions of each of said pipes, another end of each of said dams being in contact with said wet rollers said dams being operative to contain a pool of agent for uniform application to said rollers;

means for supplying the void preventing agent to said void preventing agent supply pipes; and

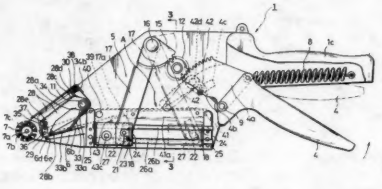
a plurality of void preventing agent supply holes formed in said void preventing agent supply pipes, said holes being arranged in the longitudinal direction of said pipes, wherein said void preventing agent flows through said supply holes into said flexible dams so as to be uniformly applied to said wet rollers.

4,986,874

HAND-LABELER

Toshikazu Kawada, Tokyo, Japan, assignor to Towa Seiko Kabushiki Kaisha, Tokyo, Japan

Filed Sep. 7, 1989, Ser. No. 404,014
Int. Cl.[5] B65C *9/18, 11/00*
U.S. Cl. 156—577 **1 Claim**



1. A labeler which has a label-carrying tape feeder operatively connected to stationary and movable handles to permit the start and stop feeding of a label-carrying tape in response to each operation of the handles, thereby separating each label from the label-carrying tape and putting it on an object, characterized in that said labeler comprises:

a body to which said stationary handle is integrally connected and said movable handle is rotatably fixed;

a feeler mount swingably fixed to said body;

a feeler swingably fixed to an end of said feeler mount to vary an angular position of said feeler relative to said feeler mount upon collision of a free end of said feeler against a forward end of each discrete label on the label-carrying tape during the start and stop feeding of the tape, thereby causing a corresponding angular displacement of said feeler mount;

a lever stop pivotally connected to said body and to said feeler mount, whereby said lever stop is pivotally displaced relative to said body in response to said angular displacement of said feeler mount to permit said label-carrying tape feeder to perform an automatic adjustment of each interval length of the label-carrying tape corresponding to the label size plus inter-label space; and

a release unit operative to release said lever stop to return to an original position and to release the free end of said feeler from the forward end of each discrete label as said handles are released and restored to their stress-free initial position.

4,986,875

TOOL FOR REMOVING TABS AND BRACKETS FROM WINDSHIELDS

Virgil E. Hamlin, Jr., 5740 Patton Way, Bakersfield, Calif. 93308

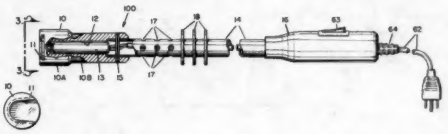
Filed Nov. 24, 1989, Ser. No. 440,691
Int. Cl.[5] B32B *31/18*
U.S. Cl. 156—584 **13 Claims**

1. An apparatus for detaching items which are glued to a surface comprising,

a heating element,

a heat transfer element of generally cylindrical configuration connected to said heating element,

one end of said heat transfer element comprising a relatively flat surface substantially normal to the length of said heat transfer element,



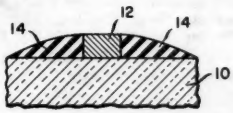
said heat transfer element includes a recess in said relatively flat surface for receiving the items to be detached, and support means connected to support said heating element.

4,986,876

METHOD OF SMOOTHING PATTERNED TRANSPARENT ELECTRODE STRIPES IN THIN FILM ELECTROLUMINESCENT DISPLAY PANEL MANUFACTURE

Robert J. Zeto, Eatontown; Eugene Hryckowian, deceased, late of Ocean by Linda V., executor ; David C. Morton, Eatontown, all of N.J.; John A. Costello, Annapolis, Md., and John C. Conrad, Ocean, N.J., assignors to The United States of America as represented by the Secretary of the Army, Washington, D.C.

Filed May 7, 1990, Ser. No. 521,879
Int. Cl.[5] B44C *1/22;* C03C *15/00, 25/06*
U.S. Cl. 156—643 **9 Claims**



1. A method of smoothing patterned transparent electrode stripes on a glass substrate in the manufacture of a thin film electroluminescent (EL) display panel, said method including the steps of:

(A) depositing a uniform layer of dielectric material over the entire glass substrate bearing the patterned transparent electrode striping.

(B) applying a uniform layer of an organic flowable photoresist material over the layer of dielectric,

(C) heating the coated substrate to a temperature at which the photoresist layer flows, and

(D) etching back through the layers to the transparent electrode.

4,986,877

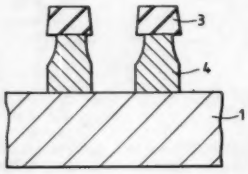
METHOD OF DRY ETCHING

Shinichi Tachi, Sayama; Kazunori Tsujimoto, Higashiyamato, and Sadayuki Okudaira, Ome, all of Japan, assignors to Hitachi, Ltd., Tokyo, Japan

Filed Jul. 25, 1988, Ser. No. 223,642
Claims priority, application Japan, Jul. 29, 1987, 62-187535
Int. Cl.[5] C23F *1/02;* B44C *1/22*
U.S. Cl. 156—643 **16 Claims**

1. A method of dry etching comprising a first step of bringing an article to be etched placed within a reaction chamber into contact with a plasma of an etching gas while maintaining said article at a first temperature to etch an exposed surface of said article at a predetermined first side etching rate and a second step of continuing the contact of said article with the

plasma of said etching gas while maintaining said article at a second temperature lower than said first temperature to etch



said article at a second side etching rate smaller than said first side etching rate.

4,986,878

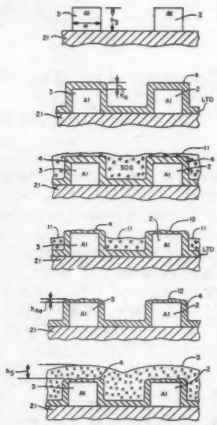
PROCESS FOR IMPROVED PLANARIZATION OF THE PASSIVATION LAYERS FOR SEMICONDUCTOR DEVICES

Alp Malazgirt, Fremont; Bala Padmakumar, Sunnyvale, and Arya Bhattacherjee, Fremont, all of Calif., assignors to Cypress Semiconductor Corp., San Jose, Calif.

Filed Jul. 19, 1988, Ser. No. 221,310

Int. Cl.[5] H01L *21/306*

U.S. Cl. 156—643 **14 Claims**



1. A process for planarizing the surface of a semiconductor device having a multilayer structure, said process comprising:

depositing a dielectric layer over at least a portion of the surface of said semiconductor device;

applying a layer of spin-on-glass over the surface of said dielectric layer;

etching away portions of said layer of spin-on-glass and portions of said dielectric layer;

removing the remaining portions of said layer of spin-on-glass;

applying a passivation layer over the surface of said semiconductor device.

4,986,879

STRUCTURE AND PROCESS FOR FORMING SEMICONDUCTOR FIELD OXIDE USING A SEALING SIDEWALL OF CONSUMABLE NITRIDE

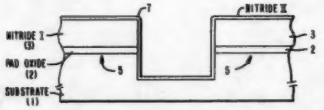
Steven S. Lee, Colorado Springs, Colo., assignor to NCR Corporation, Dayton, Ohio

Continuation-in-part of Ser. No. 356,591, May 22, 1989, Pat. No. 4,923,563, which is a continuation of Ser. No. 61,923, Jun. 15, 1987, abandoned. This application Mar. 19, 1990, Ser. No. 436,567

The portion of the term of this patent subsequent to May 8, 2007, has been disclaimed.

Int. Cl.[5] B05D *5/12*; H01L *21/306*

U.S. Cl. 156—649 **12 Claims**



1. A process for forming field oxide regions between active regions in a semiconductor substrate, comprising the steps of:

forming over the substrate active regions a pad oxide layer;

forming over the pad oxide layer a first silicon nitride layer;

selectively etching through the first nitride layer, the pad oxide layer, and into the substrate to expose the substrate and the pad oxide layer and to define field oxide regions with substantially vertical sidewalls;

forming a relatively thin screening oxide on the exposed substrate and pad oxide layer on said sidewalls;

doping selected regions of said substrate through selected horizontally disposed surfaces of said substrate underlying said field oxide regions;

forming a conformal second silicon nitride layer, over the patterned structure of the substrate and layers including the substantially vertical sidewalls, to a nominal thickness of 10–13 nm;

selectively removing said second silicon nitride layer to expose horizontally disposed surfaces of the substrate, while retaining second silicon nitride on the substantially vertical sidewalls;

oxidizing the exposed substrate and second silicon nitride in a proportion to effectuate concurrent oxidation and lifting and bending, beginning at the low edge of the retained sidewall silicon nitride; and

continuing the oxidation of the substrate and the lifting of the sidewall silicon nitride until the upper surface of the oxidized substrate reaches a predetermined level.

4,986,880

PROCESS FOR ETCHING POLYIMIDE SUBSTRATE IN FORMATION OF UNSUPPORTED ELECTRICALLY CONDUCTIVE LEADS

Jay R. Dorfman, Durham, N.C., assignor to E. I. Du Pont de Nemours and Company, Wilmington, Del.

Filed Nov. 29, 1989, Ser. No. 442,811

Int. Cl.[5] B44C *1/22*; B29C *37/00*; C23F *1/02*; C03C *15/00*

U.S. Cl. 156—655 **10 Claims**

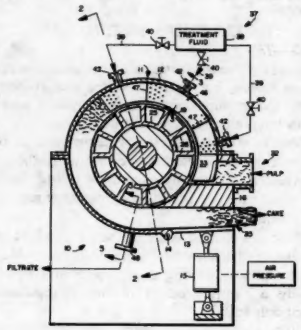
1. A process for formation of an electrically conductive lead with an unsupported portion formed by removal through etching of a portion of a polyimide substrate supporting an electrically conductive material comprising the application of an etching solution consisting essentially of about 87 to 89% by weight of ethanol and about 13 to 11% by weight of potassium hydroxide, sodium hydroxide or cesium hydroxide in aqueous solution to the surface of a polyimide substrate other than a substrate surface facing and supporting the electrically conductive material whereby a polyimide layer which supports electrically conductive material is removed.

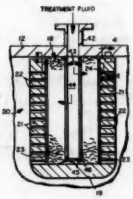
4,986,881

METHOD AND APPARATUS FOR LIQUID TREATMENT OF AND LIQUID EXTRACTION ON A PAPER PULP

Erwin D. Funk, Queensbury, N.Y., assignor to Kamyr, Inc., Glens Falls, N.Y.

Filed Jun. 28, 1989, Ser. No. 372,447
Int. Cl.[5] D21C 9/02, 9/06
U.S. Cl. 162—56 20 Claims





1. A device for liquid treatment of a suspension of cellulosic fibrous material, comprising:

(a) a housing having an outer, essentially solid, wall; including an adjustable portion; p1 (b) means defining a channel having a solid root wall and a pair of side walls with an open face opposite said root wall, the channel being elongated in a dimension and positioned so that the open face thereof is adjacent said housing outer wall, and at least one of said side walls is perforated;

(c) means for moving said root wall, and at least one of said side walls, with respect to said outer wall in the dimension of elongation of said channel;

(d) means for feeding material to be treated into said channel at one portion of said housing;

(e) an outlet for passage of treated material out of said channel and said housing adjacent said adjustable portion of said housing outer wall;

(f) means for introducing treatment fluid into said channel, between said means (d) and (e), through said housing outer wall, so that the treatment fluid passes generally parallel to said root wall, through the material to treat it, and out perforations in at least one of said channel walls; and

(g) means for providing discharge from the housing of liquid that has passed through perforations in at least one of said channel walls.

17. A method for treating a suspension of cellulosic fibrous material, using an arcuate root wall rotatable about an axis and defining an open channel with a pair of side walls extending radially outwardly with respect to the root wall, at least one of the side walls rotatable with the root wall, and at least one of the channel-defining walls being perforated, said method comprising continuously and progressively:

(a) rotating the root wall about an axis;

(b) introducing a suspension of cellulosic fibrous material at a consistency of about 2–16% by weight into the channel;

(c) introducing treatment fluid into the suspension in a center portion of the channel so that the treatment fluid permeates the suspension, flowing parallel with respect to said axis therethrough;

(d) effecting removal of liquid from the channel through perforated walls defining the channel to facilitate treatment and thickening of the suspension; and

(e) discharging suspension having a consistency greater than that of the introduced suspension.

4,986,882

ABSORBENT PAPER COMPRISING POLYMER-MODIFIED FIBROUS PULPS AND WET-LAYING PROCESS FOR THE PRODUCTION THEREOF

Larry N. Mackey, and Seyed E. Seyed-Rezai, both of Fairfield, Ohio, assignors to The Proctor & Gamble Company, Cincinnati, Ohio

Filed Jul. 11, 1989, Ser. No. 378,154
Int. Cl.[5] D21H 13/02
U.S. Cl. 162—109 20 Claims

1. In a continuous wet-laying papermaking process for the manufacture of absorbent paper sheets from two or more fibrous cellulosic pulps, wherein at least one of said fibrous cellulosic pulps, A, is a polymer-modified fibrous cellulosic pulp, capable of being protonated, which, in its alkali-metal-cation exchanged state, imbibes water by hydrocolloidal swelling, and wherein the balance of said fibrous cellulosic pulps, B, is non-polymer modified and comprises conventional cellulosic papermaking pulps, said process comprising the steps of web lay-down and dewatering starting from an aqueous suspension, slurry or stock containing a mixture of the pulps, the improvement which comprises conducting the wet-laying process by wet-laying an acidified mixture of the A and B pulps in the absence of interfering cationic materials, under conditions wherein pulp A is laid down in an embryonic web in the protonated state and wherein said embryonic web is at least partially dewatered while maintaining pulp A in said protonated state; said process comprising the sequence of steps:

(a) treating stock of said fibrous cellulosic pulps with acid; the amount of said acid being sufficient to ensure that in subsequent step (b), the type A component of said fibrous pulps is maintained in said protonated state;

(b) wet-laying the acidic stock formed in step (a) from a single-channel or multi-channel headbox onto a first foraminous member, thereby draining water to the extent of forming an embryonic web, said embryonic web having one or more layers;

(c) at least partially dewatering the embryonic web in one or more steps to provide a partially dewatered web;

(d) contacting the partially dewatered web of step (c) with an aqueous solution of alkali so as to at least partially bring the fibrous cellulosic pulp type A component of the web to the alkali-metal cation-exchanged state; and

(e) drying the web.

4,986,883

METHOD FOR CALENDERING PAPER AND PAPER MANUFACTURED BY THE METHOD

Jyrki Taipale, Tampere, and Jaakko Sarantola, Valkeakoski, both of Finland, assignors to Yhtyneet Paperitehtaat Oy, Valkeakoski, Finland

Filed Jun. 16, 1989, Ser. No. 366,978
Claims priority, application Finland, Nov. 17, 1988, 885319
Int. Cl.[5] D21G 1/00
U.S. Cl. 162—205 9 Claims

1. A method for calendering paper in a calender including

press rolls arranged successively in a paper advancing direction with press nips being formed between at least some of the rolls for passing paper therethrough, each press nip being formed by a pair of rolls, one being hard and the other elastic, and having a calculable line pressure, said method comprising the steps of:

advancing the paper into said calender at an initial paper moisture X being within the range of $12\% \leqq X \leqq 25\%$ and the calculable line pressure of at least one of the nips being higher than 250 kN/m; and

maintaining a ratio X/LP during operation between a paper moisture X and a calculable line pressure LP of a nip within predetermined limits in such a manner that a maximum value of ratio X/LP as divided by a minimum value of ratio X/LP is lower than or equal to 2.15, wherein said X refers to the a moisture percentage of paper and LP is a line pressure in a particular press nip expressed as a quantity kN/m (kilonewton/meter).

4,986,884

PROCESS FOR THE PRODUCTION OF MONOMERIC α-CYANOACRYLATES

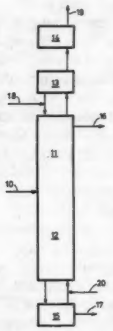
Wolfgang Arlt, Odenthal; Helmut Waniczek, Cologne; Richard Viard, Leverkusen, and Dieter Brück, Cologne, all of Fed. Rep. of Germany, assignors to Bayer Aktiengesellschaft, Fed. Rep. of Germany

Filed Oct. 28, 1987, Ser. No. 113,648

Claims priority, application Fed. Rep. of Germany, Nov. 8, 1986, 3638171

Int. Cl.[5] B01D *3/10, 3/34;* C07C *255/02*

U.S. Cl. 203—8 6 Claims



1. A process for the purification of monomeric α-cyanoacrylates comprising the steps of utilizing a countercurrent distillation apparatus having more than ten separation stages and a dephlegmator, introducing monomeric α-cyanoacrylates into the apparatus, distilling the monomeric α-cyanoacrylates under reduced pressure of from 5 to 100 mbar, carrying out the distillation over more than ten separation stages, continuously introducing inhibitors into the countercurrent distillation apparatus at the upper separation stage, and feeding liquid α-cyanoacrylate into the distillation apparatus at those places where condensate is collected.

4,986,885

PROCESS FOR THE SEPARATION OF BUTANOL AND BUTOXYACETALDEHYDE

Robert K. Driscoll, Frankfurt am Main; Ingo Leupold, Neu-Anspach, and Karl-Heinz Schönwälder, Kelkheim, all of Fed. Rep. of Germany, assignors to Hoechst Aktiengesellschaft, Frankfurt am Main, Fed. Rep. of Germany

Filed Mar. 29, 1989, Ser. No. 329,942

Claims priority, application Fed. Rep. of Germany, Mar. 31, 1988, 3811059

Int. Cl.[5] B01D *3/10;* C07C *45/82*

U.S. Cl. 203—73 12 Claims

1. A process for the separation of a composition comprising, butoxyacetaldehyde, butylglycol, water and a compound selected from the group consisting of butanol and mixtures thereof with butyraldehyde, which comprises

(a) distilling in a first stage the water overhead as an azeotrope with butoxyacetaldehyde, allowing the condensate to separate into two phases and recycling the upper, organic phase into the first distillation stage and obtaining a sump product,

(b) distilling in a second stage the sump product of stage (a) at a pressure of at most 660 mbar, thus removing overhead butanol and low boiling compounds and obtaining substantially a sump product of butoxyacetaldehyde and butylglycol, and

(c) distilling in a third stage nearly pure butoxyacetaldehyde overhead from the sump produce of stage (b), thus leaving butylglycol in the sump.

4,986,886

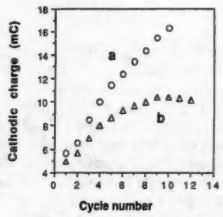
POLYMERIZATION OF THIOPHENE AND ITS DERIVATIVES

Yen Wei, Philadelphia; Guang-Way Jang, Upper Darby, and Chi-Cheung Chan, Philadelphia, all of Pa., assignors to Drexel University, Philadelphia, Pa.

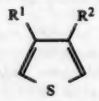
Filed May 30, 1990, Ser. No. 530,377

Int. Cl.[5] C25B *3/02*

U.S. Cl. 204—78 31 Claims



1. A method for polymerizing a compound having the following formula:



(I)

wherein R^1 and R^2 are independently hydrogen, R^3, $—OR^3$ or $—SR^3$; and R^3 is aryl of 6 to 12 carbons or aliphatic of 1 to 12 carbons, comprising reacting the compound of formula I in the presence of:

a an initiator, the initiator comprising a 2-substituted thiophene nucleus which has a lower oxidation potential than the compound of formula I and which is capable of being incorporated into the polymer resulting from the polymerization reaction;

b. a chemical oxidant or an applied electrochemical potential; and

c. a non-aqueous organic solvent.

4,986,887

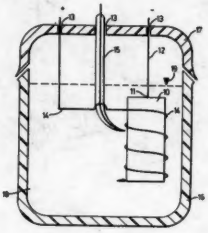
PROCESS AND APPARATUS FOR GENERATING HIGH DENSITY HYDROGEN IN A MATRIX

Sankar Das Gupta, 29 Sullivan Street, Toronto, Ontario, and James K. Jacobs, 60 Albany Avenue, Toronto, Ontario, M5R 3C2, both of Canada

Filed Mar. 31, 1989, Ser. No. 331,126

Int. Cl.[5] C25B *1/02*

U.S. Cl. 204—129 20 Claims



1. A process for retaining hydrogen gas, and its isotopes in a mixed state, in high density in a palladium bearing matrix, said hydrogen and its isotopes having been generated by electrolysis of water, comprising the steps of:

(a) providing a palladium bearing cathode and an inert anode;

(b) providing an electrolyte comprising:

(i) a lithium salt,

(ii) an aprotic solvent having higher solubility for said lithium salt than for lithium hydride, thereby enhancing the retention of hydrogen and its isotopes in said palladium bearing cathode, and containing said lithium salt in a concentration not exceeding 10 Molar, and

(iii) water in a concentration less than 0.1M;

(c) immersing said cathode and said anode in said electrolyte;

(d) connecting said cathode and said anode so immersed to an external electrical energy source, said energy source being adapted to provide electrical potential difference between said anode and said cathode of magnitude of at least 200 mV in excess of the potential difference required to electrolyze water, thereby generating hydrogen and its isotopes as a mixture at said cathode, and simultaneously retaining said generated hydrogen and its isotopes in said cathode; and

(e) continuing the generation of hydrogen and its isotopes until said palladium bearing cathode is saturated, and hydrogen and its isotopes are evolving in gaseous form at said cathode.

4,986,888

ELECTROPLATING APPARATUS FOR PLATE-SHAPED WORKPIECES

Daniel Hosten, Handzame, and Lothar Floegel, Neuried, both of Fed. Rep. of Germany, assignors to Siemens Aktiengesellschaft, Berlin and Munich, Fed. Rep. of Germany

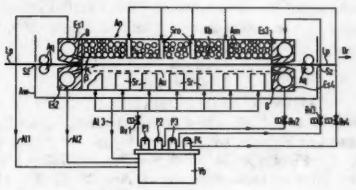
Filed Jun. 8, 1989, Ser. No. 363,522

Claims priority, application Fed. Rep. of Germany, Jul. 7, 1988, 3823072

Int. Cl.[5] C25D *17/00*

U.S. Cl. 204—198 17 Claims

1. An electroplating apparatus for plate-shaped perforated printed circuit boards, said apparatus having a horizontal throughput path between at least one upper anode and at least one bottom anode, said anodes extending parallel to said path, said apparatus having electrolyte headers directed transversely relative to the path being arranged with a pair of headers at the inlet side and a pair of headers at the discharge side with each pair having an upper header above the path and a lower header below the path, said electrolyte headers having openings for the passage of the electrolyte solution, said openings being arranged for discharging into gaps between the path and the upper and lower anodes, respectively, and for withdrawing



electrolyte in said gap, and means disposed between said two lower headers for generating an upwardly directed flow component from below said path, the improvements comprising a plurality of upper wash jets being positioned above the throughput path between the upper two electrolyte headers, said upper wash jets extending transversely relative to the throughput path and being chargeable with an electrolyte solution for discharge onto a plate-shaped, perforated printed circuit board passing therethrough.

4,986,889

SUCTION CUP FOR THE ELECTROLYTIC TREATMENT OF A SURFACE

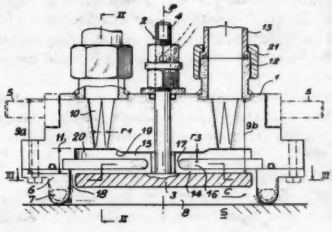
André Charamathieu, Fontenay Aux Roses; Gérard Gouaillardou, Savigny Sur Orge, and Jean-Pierre Cizel, Arpajon, all of France, assignors to Societe des techniques en Milieu Ionisant STMI, France

Filed Dec. 20, 1989, Ser. No. 453,990

Claims priority, application France, Dec. 23, 1988, 88 17115

Int. Cl.[5] C25D *17/14*

U.S. Cl. 204—279 11 Claims



1. A suction cup for the electrolytic treatment of a surface (S) comprising a generally electrically insulating casing (1) partly defining a cavity for holding electrolyte, the casing (1) being adapted for holding an electrode (3) installed in the cavity, said electrode adapted for connection to a current source, two connections (12) for respective electrolyte ducts (13) which communicate with the cavity, a closed contour elastic joint (6) partly defining the cavity and being engaged against the surface, the electrode (3) being located above the surface at a uniform distance therefrom and subdividing the cavity into an electrolyte flow chamber (8) located between the electrode and the surface, an electrolyte admission chamber (9*a*) located between the flow chamber and one of the connections and an electrolyte suction chamber (9*b*) located

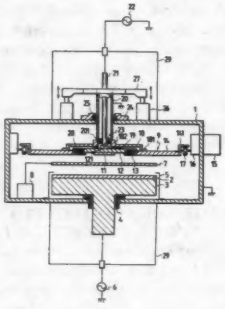
between the flow chamber and the other connection, wherein the electrode is continuous and the admission and suction chambers each comprise a flow equalizing chamber (11) communicating with the flow chamber by way of a respective first slot (18), the first slots being located on opposite sides of the flow chamber, the flow equalizing chambers each comprising a first channel (14) communicating with the respective first slot (18), in which the electrolyte flows opposite to its flow in the flow chamber (8), and a distribution chamber (10) communicating with the respective connection (12) and the flow equalizing chamber, the dimension of each distribution chamber increasing in a direction in which said first slots extend.

4,986,890

THIN FILM DEPOSITION SYSTEM

Eiji Setoyama, and Mitsuhiro Kamei, both of Hitachi, Japan, assignors to Hitachi, Ltd., Tokyo, Japan

Filed Apr. 24, 1990, Ser. No. 513,763
Claims priority, application Japan, Apr. 28, 1989, 1-110690
Int. Cl.[5] C23C *14/34*
U.S. Cl. 204—298.06 17 Claims



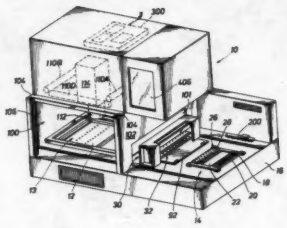
1. A thin film deposition system comprising:
a vacuum chamber;
a cathode electrode disposed in said vacuum chamber;
a target disposed in said vacuum chamber and mounted on said cathode electrode, said target being supplied with radio frequency during sputtering by said cathode electrode;
a substrate holder, disposed in said vacuum chamber so as to oppose said target with a distance therebetween, for holding a substrate at one side, a front side, of said substrate holder;
transfer means for moving said substrate holder so as to transfer the substrate held by said substrate holder to or from a film deposition position from or to another position;
a substrate electrode for applying radio frequency voltage to said substrate through said substrate holder;
means for effecting relative movement between said substrate electrode and said substrate holder when said substrate is at the film deposition position so that said substrate electrode is intimately contacted with or separated from said substrate holder at an opposite side to the front side;
shielding means for shielding radio frequency from said substrate electrode and the opposite side of said substrate holder to prevent formation of glow-discharge between said substrate electrode and a surrounding portion and between the opposite side of said substrate holder and a portion surrounding the opposite side of said substrate holder.

4,986,891

AUTOMATIC ELECTROPHORESIS APPARATUS AND METHOD

Robert J. Sarrine, Beaumont; Henry A. Garsee, Kountz; Charles D. Kelley, Beaumont, and Philip A. Guadagno, Vidor, all of Tex., assignors to Helena Laboratories Corporation, Beaumont, Tex.

Continuation-in-part of Ser. No. 26,465, Mar. 16, 1987, Pat. No. 4,810,348. This application Oct. 27, 1988, Ser. No. 263,627
Int. Cl.[5] G01N *27/28, 27/26;* B01D *57/02*
U.S. Cl. 204—299 R 20 Claims



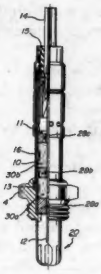
1. Electrophoresis apparatus comprising,
a base,
an application plate longitudinally disposed on said base and having top and bottom surfaces,
an electrophoresis support medium removably secured to said top surface of said application plate and adapted to accept a liquid sample, said support medium having longitudinal and lateral dimensions, said support medium including a lateral row of application wells on its surface,
robotic means for applying a liquid sample to each application well of said lateral row of application wells of said support medium including,
a sample plate having a lateral row of liquid sample wells, said sample plate being longitudinally disposed on said base and separated from said application plate,
track means secured to said base,
a pipette assembly including a lateral row of pipettes spaced from each other corresponding to said lateral row of sample wells of said sample plate and to said application wells of said support medium,
robotic frame means supported by sad track means and carrying said pipette assembly for longitudinally moving said row of pipettes between said lateral row of said sample wells of said sample plate and said lateral row of application wells of said support medium,
mechanical alignment means for precisely aligning said lateral row of pipettes with said lateral row of application wells when said pipettes are moved to said application wells of said support medium,
control means for causing aspiration of liquid sample into said pipettes from corresponding wells of said sample wells when said pipettes are positioned at said sample plate and for depositing liquid sample from said pipettes into corresponding wells of said application wells when said pipettes are positioned at said application wells, and
means for longitudinally applying an electrophoresis current to said support medium substantially uniformly across its lateral extent operably creating an electrophoretically longitudinally displaced pattern of components of said liquid samples.

4,986,892

OXYGEN SENSOR

Nobuhide Kato, Aichi, and Masanori Katsu, Nagoya, both of Japan, assignors to NGK Insulators, Ltd., Japan

Filed May 2, 1990, Ser. No. 517,701
Claims priority, application Japan, May 15, 1989, 1-55571[U]
Int. Cl.[5] G01N *27/409*
U.S. Cl. 204—427 1 Claim



1. An oxygen sensor comprising a sensor element having electrodes on inner and outer surfaces thereof, the electrode on the inner surface communicating to the atmosphere, and the electrode on the outer surface communicating to a gas to be measured; a metallic accommodating member accommodating the sensor element; and at least two airtight sealing portions of powder arranged in the accommodating member for separating the gas to be measured from the atmosphere, at least one airtight sealing portion at the low temperature side of the oxygen sensor having a recessed portion formed under compression by pressing the outer surface of the metallic accommodating member after the formation of the airtight sealing portions by compressing the powder in the axial direction of the oxygen sensor.

4,986,893

PROCESS FOR PRODUCING PITCH FOR CARBON MATERIALS

Ikuo Seo; Saburou Takahashi, and Tooru Ohono, all of Iwaki, Japan, assignors to Kureha Kagaku Kogyo Kabushiki Kaisha, Tokyo, Japan

Continuation-in-part of Ser. No. 214,529, Jul. 1, 1988, abandoned. This application Jan. 4, 1990, Ser. No. 461,036
Claims priority, application Japan, Jul. 8, 1987, 62-170739; Jun. 30, 1988, 63-163064
Int. Cl.[5] C01C *3/00*
U.S. Cl. 208—39 6 Claims

1. A process for producing an optically anisotropic pitch for carbon materials having a quinoline insoluble component of not more than 0.5% by weight, comprising the steps of:

(1) polymerizing naphthalene by heating at a temperature of 100° to 300° C. for 0.5 to 100 hours in the presence of a Lewis acid catalyst;

(2) removing said catalyst from the reaction mixture;

(3) subjecting said reaction mixture to thermal treatment at a temperature of 390° to 450° C. for 1 to 5 hours under a pressure of from not less than an atmospheric pressure to 5 kgf/cm^2G so as to produce neither a quinoline-insoluble pitch nor an optically anisotropic pitch, thereby carrying out aromatization of the polymerizate of naphthalene; and

(4) heating the thus treated material at a temperature of 350° to 380° C. for 3 to 10 hours under a reduced pressure under the flow of an inert gas, thereby removing volatile components from said material and obtaining substantially quinoline soluble and optically anisotropic pitch.

4,986,894

CATALYTIC HYDROISOMERIZATION PROCESS

Kathleen M. Keville, Woodbury; Quang N. Le, Cherry Hill; Wang-Tsee T. Mo, Mt. Laurel, all of N.J., and Mae K. Rubin, Bala Cynwyd, Pa., assignors to Mobil Oil Corp., Fairfax, Va.

Continuation-in-part of Ser. No. 254,524, Oct. 6, 1988, Pat. No. 4,954,325, which is a continuation-in-part of Ser. No. 98,176, Sep. 18, 1987, abandoned, which is a continuation-in-part of Ser. No. 890,268, Jul. 29, 1986, abandoned. This application Mar. 19, 1990, Ser. No. 495,545
Int. Cl.[5] C10G *47/20*
U.S. Cl. 208—27 21 Claims

1. A process for dewaxing a waxy hydrocarbon feedstock, said process comprising contacting said feedstock with a catalyst composition under hydroisomerization conditions to produce a product with a reduced pour point, said catalyst composition comprising a synthetic zeolite characterized by an X-ray diffraction pattern including values substantially as shown in Table A of the specification and having an Alpha Value of about 10 or less.

4,986,895

PROCESS FOR TREATING COAL TAR OR COAL TAR PITCH

Makihiko Mori, Kitakatsuragi; Katsumi Fujita, Osaka; Yoshiteru Nakagawa, Yamatokoriyama; Yasunori Goda, Takarazuka; Toyohiro Maeda, Tenri, all of Japan

Continuation of Ser. No. 216,364, Jul. 7, 1988, abandoned, which is a continuation-in-part of Ser. No. 719,101, Apr. 9, 1985, abandoned. This application Sep. 5, 1989, Ser. No. 403,908
Claims priority, application Japan, Aug. 29, 1983, 58-158658
Int. Cl.[5] C10C *1/20, 3/02*
U.S. Cl. 208—39 8 Claims

1. A process for treating a material consisting essentially of coal tar or coal tar pitch containing primary QI component solids 0.3 um or less in particle size comprising the steps of:

(a) subjecting said material to a primary centrifugation at a temperature of from 200 to 400° C. to separate said primary QI component solids and to form a primary supernatant coal tar or coal tar pitch liquid substantially free of said primary QI component solids;

(b) separating said primary supernatant from said primary QI component solids;

(c) heat-treating said primary supernatant at a temperature at a temperature and pressure and for a time sufficient to form in said primary supernatant secondary QI component solids in the form of meso-carbon microbeads, said temperature being within the range of 300 to 500° C., said pressure being in the range of ambient to 20 kg/cm^2 G, and said time being from ½ to 50 hours;

(d) subjecting said primary supernatant from step (c) to a secondary centrifugation at a temperature of from 150 to 450° C. to separate said secondary QI component solids and to form a secondary supernatant coal tar or coal tar pitch substantially free of said primary and secondary QI component solids;

(e) separating said secondary supernatant from said secondary QI component solids; and

(f) recovering said secondary QI component solids as a product useful for making high density isotropic carbon articles.

4,986,896

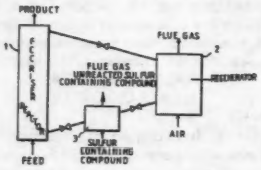
METHOD FOR PASSIVATING METALS ON AN FCC CATALYST

Amos A. Avidan, Yardley, Pa., and Arthur A. Chin, Cherry Hill, N.J., assignors to Mobil Oil Corp., Fairfax, Va.

Filed Apr. 13, 1989, Ser. No. 337,685
Int. Cl.[5] C10G *11/00*; B01J *38/04*
U.S. Cl. 208—52 CT 9 Claims

1. In a method for passivating contaminating metals on a crystalline aluminosilicate zeolite FCC catalyst comprising treating the catalyst with a sufficient amount of a sulfur-con-

taining compound capable of associating with the contaminating metals when in contact therewith, the improvement comprising contacting the catalyst with the sulfur-containing compound for at least three seconds, said contacting occurring in a



separate treatment vessel, containing internal baffles ventilating unreacted sulfur-containing compound away from entry into a riser/reactor and recycling a portion of unreacted sulfur-containing compound back to the treating vessel, wherein the FCC catalyst contains fines in the treating vessel.

4,986,897

CATALYTIC CONVERSION OF NO_x WITH NH_3

Arthur A. Chin, Cherry Hill, N.J., assignor to Mobil Oil Corporation, Fairfax, Va.

Filed Dec. 28, 1989, Ser. No. 458,054

Int. Cl.[5] C10G *11/18*

U.S. Cl. 208—113 **17 Claims**

1. A process for reducing the nitrogen oxides (NO_x) content of a flue gas stream containing NO_x produced by a combustion process comprising:

(a) removing said flue gas stream from said combustion process,

(b) contacting, in a NO_x reduction zone, operating at NO_x reduction conditions including a temperature above about 900° F., said flue gas stream with ammonia or an ammonia precursor and a catalytically effective amount of a catalyst comprising bismuth and oxides of bismuth to reduce NO_x to nitrogen in the presence of ammonia and reducing the content of NO_x in said flue gas.

4,986,898

METHOD OF REMOVING MERCURY FROM HYDROCARBON OILS

Takashi Torihata, and Satoyuki Nisimura, both of Chiba, Japan, assignors to Mitsui Petrochemical Industries, Ltd., Tokyo, Japan

Filed May 15, 1989, Ser. No. 351,593

Claims priority, application Japan, May 16, 1988, 63-118835; Jun. 14, 1988, 63-146325

Int. Cl.[5] C10G *17/00*

U.S. Cl. 208—251 R **3 Claims**

1. A method for removing mercury and its compounds from a hydrocarbon oil comprising

preheating the hydrocarbon oil to a temperature of from 150 to 300° C. under a pressure of from 0.5 to 35 kgf/cm^2G, and

contacting the hydrocarbon oil with a treating agent at a temperature of from 20 to 250° C.,

wherein said treating agent is at least a member selected from the group consisting of iron, nickel, copper, zinc, aluminum, cadmium and their alloys, oxides, chlorides or sulfides supported in or on alumina,

said treating agent being in granular or powdery form.

4,986,899

METHOD OF ADSORPTION

Peter J. Parsons, Redditch, England, assignor to British Gas plc, London, England

Filed Sep. 14, 1989, Ser. No. 407,055

Claims priority, application United Kingdom, Sep. 14, 1988, 8821514

Int. Cl.[5] C10G *25/00*

U.S. Cl. 208—310 R **7 Claims**

1. A method of operating an adsorption system for control of the output quality of a gas containing a hydrocarbon comprising:

providing two adsorption beds;

providing a feed gas that is passed through the beds whereby hydrocarbon is absorbed;

passing the feed gas through a first bed in an adsorption mode; and

before changeover of said first bed from adsorption mode to regeneration mode,

splitting the feed gas flow into parallel streams through both first and second absorption bed and recombining the output gas from said first bed and said second bed.

4,986,900

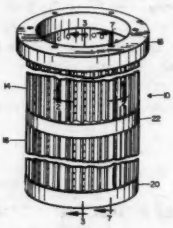
SECTIONAL SCREEN CYLINDER

Chauncey Mason, Bolton Landing, N.Y., assignor to A. Ahlstrom Corporation, Karhula, Finland

Filed Apr. 4, 1989, Ser. No. 332,737

Int. Cl.[5] B07B *1/46, 1/18;* B01D *39/00*

U.S. Cl. 209—397 **38 Claims**



1. Apparatus for forming a screen cylinder comprising:

a plurality of elements formed solely of a ceramic material and having spaced opposite first and second edges;

means defining screen openings in each element; and

means for interconnecting said elements one with the other along their edges to form a substantially continuous screen cylinder.

4,986,901

BOTTLED WATER CAP WITH INDICATOR AND ADAPTOR

John Nohren, Jr., and Joseph H. Nohren, both of Clearwater, Fla., assignors to Innova Pure Water Inc., Clearwater, Fla.

Filed Feb. 12, 1990, Ser. No. 478,470

Int. Cl.[5] B01D *35/143*

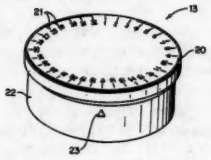
U.S. Cl. 210—85 **21 Claims**

1. Water treatment apparatus for attachment to a bottle with an opening at a neck portion thereof, comprising:

an elongated tube having first and second ends;

cartridge means containing water treatment media operatively connected to said tube second end;

cap means for capping the first end of said tube, and for cooperating with the bottle neck to position the apparatus in the bottle, said cap means comprising a body and a top; said body having means defining fluid passageways therein adjacent, but radially spaced from, said tube first end to allow flow of liquid therethrough; and said top



movable with respect to said body to selectively cover or uncover said fluid passageways;

detent means associated with said cap body and said cap top for providing detented rotation of said cap top with respect to said cap body; and

indicia means associated with said cap top and said cap body for indicating each detented position of said top with respect to said body.

4,986,902

CHLORINATION SYSTEM FOR A WATER TO BE TREATED

Pierre Serna, Portet, France, assignor to Societe Nationale Elf Aquitaine (Production), Courbevoie, France

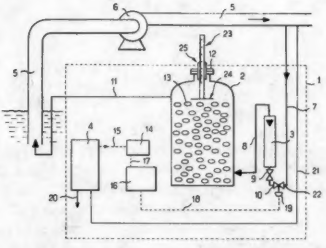
PCT No. PCT/FR88/00346, § 371 Date May 4, 1989, § 102(e) Date May 4, 1989, PCT Pub. No. WO89/00546, PCT Pub. Date Jan. 26, 1989

PCT Filed Jun. 29, 1988, Ser. No. 347,900

Claims priority, application France, Jul. 17, 1987, 87 10111

Int. Cl.[5] C02F *1/00*

U.S. Cl. 210—86 **10 Claims**



1. A system for chlorination of a fluid to be treated, which comprises:

a container containing trichlorocyanuric acid in a solid and compact form,

a first pipe for supplying said container with dissolving fluid,

an evacuation pipe in which chlorinated fluid circulates, connecting said container to a pipe which contains the fluid to be treated,

a chlorine analyzer connected to said pipe and which includes means for continuously measuring the amount of active chlorine in the treated fluid and released constantly by direct contact of the fluid to be treated with a surface of the trichlorocyanuric acid; and

flow rate regulation means (16) connected to supply means and including means to for constantly varying a continuous flow rate of the dissolving fluid passing into said container as a function of the amount of active chlorine present in the treated fluid and measured by said chlorine analyzer.

4,986,903

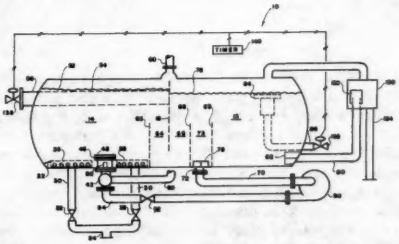
INDUCED STATIC SINGLE FLOTATION CELL

Anthony S. Canzoneri, 2408 Kentucky Ave., Kenner, La. 70063, and Ronald A. Boze, 19 Wisteria La., Covington, La. 70433

Continuation-in-part of Ser. No. 255,505, Oct. 11, 1988, abandoned. This application Jul. 25, 1989, Ser. No. 385,005

Int. Cl.[5] B01D *17/035*; B03D *1/24*

U.S. Cl. 210—90 **20 Claims**



1. An apparatus for removal of suspended matter from a liquid, comprising:

a substantially cylindrical vessel having an interior chamber adapted to receive a flow of liquid having suspended matter therein;

a non-continuous separation wall means dividing the interior chamber into a gasification and a degasification chambers, said separation wall means allowing fluid communication between gasification and degasification chambers;

a primary liquid inlet means for introducing the flow of liquid having suspended matter therein into the gasification chamber, said liquid inlet means comprising at least one liquid header means positioned adjacent a bottom of the gasification chamber and having a plurality of openings to allow admission of the liquid into the gasification chamber;

a gas inlet means for introducing a flow of gas into the gasification chamber attracting the suspended matter and for carrying the suspended matter upwardly to an upper portion of the vessel, said gas inlet means comprising at least one gas eductor means injecting gas into the gasification chamber at a level above said liquid header, said gas inlet means further comprising a secondary liquid inlet means in said gas eductor means for educting said gas;

a primary skim collection means extending along the upper portion of the gasification chamber;

a secondary skim collection means positioned in the degasification chamber, said secondary skim collection means comprising vertically adjustable means for controlling skim collection based on difference in specific gravity of liquid in the degasification chamber and the gasification chamber;

treated liquid outlet means for removing treated liquid from the degasification chamber; and

means for controlling skim collection from said primary and said secondary skim collection means.

4,986,904

COLOR CODED DISPOSABLE FILTER HOLDER

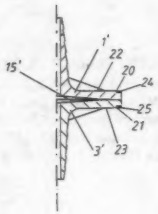
Robert Bugar, Einbeck; Asok Chakraborty, Gottingen, and Herbert Urlaub, Einbeck, all of Fed. Rep. of Germany, assignors to Schleicher & Schuell GmbH, Fed. Rep. of Germany

Filed Nov. 30, 1989, Ser. No. 443,532

Claims priority, application European Pat. Off., Dec. 20, 1988, 88121316.9

Int. Cl.[5] B01D *29/085*

U.S. Cl. 210—94 7 Claims



1. A plastic, color-coded disposable-filter holder, comprising a first disk-like housing piece with an intake stub and a second disk-like housing piece with a discharge stub, a disk-shaped filter sandwiched between the two housing pieces which are joined together at their radially outer rim zones by their mutually facing axial surfaces in rigid, leak-proof and pressure-resistant manner, further comprising a plastic color coding means enveloping the disposable filter holder at a periphery of the disk-like housing pieces for identifying a structural characteristic of the filter, wherein the color coding means (19;24,25) extends throughout at least one clearance (18;20,21) in at least one of the first housing piece (1;1') and the second housing piece (3;3') without projecting beyond the outer contour of the housing pieces (1,3;1',3').

4,986,905

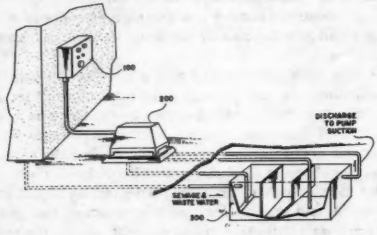
DISTRIBUTION CONTROL SYSTEM FOR RECYCLING TREATED SEWAGE WATER FOR IRRIGATION

Rocky R. White, 1201 Oak Rd., Lilburn, Ga. 30247

Filed Jun. 21, 1989, Ser. No. 369,651

Int. Cl.[5] C02F *9/00*; E02B *11/00*; B05B *15/00*

U.S. Cl. 210—104 9 Claims



1. A sewage treatment system comprising:

an underground sewage tank connected to receive waste water;

the sewage tank including a treatment chamber receiving and treating the waste water to produce effluent, and a holding tank receiving and holding treated unfiltered effluent from the treatment chamber;

means in the holding tank responsive to the level of effluent therein;

a pump having an inlet in communication with the underground holding tank to withdraw unfiltered effluent therefrom;

drip feed irrigation distribution means located below ground and receiving the pumped effluent so as to disseminate the effluent into the ground;

pump control means responsive to the means in the holding tank to actuate the pump when said effluent level reaches a predetermined high level;

filter means selectively connected between the pump outlet and the irrigation distribution means so that effluent pumped from the holding tank to the irrigation distribution means passes through the filter means in a forward direction, whereby the filter means entraps particulate matter in the effluent;

backwash valve means operatively connected to said pump and selectively operative to cause effluent from the pump outlet to flow through the filter means in a reverse direction to backwash the filter means, thereby removing particulate matter previously entrapped in the filter means; and

means receiving the backwashing effluent and extending to the treatment chamber of the underground sewage tank and returning to the treatment chamber the backwashing effluent and particulate matter removed from the filter means.

4,986,906

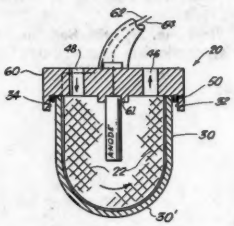
SWIMMING POOL WATER PURIFICATION SYSTEM

Joseph T. Dadisman, Fort Lauderdale, Fla., assignor to Clear & Pure, Inc., Fort Lauderdale, Fla.

Continuation-in-part of Ser. No. 256,611, Oct. 12, 1988, abandoned. This application May 1, 1990, Ser. No. 518,760

Int. Cl.[5] C02F *1/467*, *1/50*; E04H *4/12*

U.S. Cl. 210—169 10 Claims



1. A water purifying system comprising:

an electrode system, comprising an anode and a cathode, said electrode system being immersible in a fluid;

means for providing a constant electrical current between said anode and said cathode despite changes in electrical resistance in said fluid;

means for facilitating ionic erosion of said anode into said fluid;

means for facilitating plating on said cathode whereby food particles clustered together in response to the interaction between said food particles and said constant electric current are plated on said cathode along with ions from said fluid resulting from said ionic erosion of said anode;

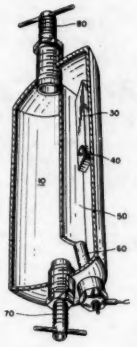
means for filtering fluid which has passed through said constant electrical current between said anode and said cathode; whereby food particles for micro organisms in said fluid which have clustered together in response to the interaction between said food particles and said constant electric current flowing between said anode and said cathode and which food particles have not been removed from said fluid by said plating on said cathode are further removed from said fluid.

4,986,907

FUEL PURIFYING APPARATUS

Luis A. Montemayor Uzeta, Avenida Topochico 801, Col. Anahuac, San Nicolás de los Garza, Nuevo León, Mexico

Filed Feb. 1, 1989, Ser. No. 305,277
Int. Cl.[5] B01D *17/028*
U.S. Cl. 210—179 7 Claims



1. A fuel purifying apparatus for a vehicle's engine comprising:

a hollow body having an upper and a lower portion;

a fuel intake orifice, in the upper portion, in fluid communication with a fuel supply;

an interior fuel flow conduit within the hollow body and in fluid communication with the fuel intake orifice, said fuel flow conduit having a fuel discharge orifice positioned below the fuel intake orifice;

a generally flat heat conducting deflector plate located inside the body adjacent to the fuel discharge orifice and connected to a heat source, a longitudinal axis of the plate being positioned parallel to a longitudinal axis of the body and angled relative to the fuel discharge orifice so that fuel discharged from the discharge orifice contacts the plate to create a centrifugal current thereby causing turbulence which separates impurities from the fuel; and

a fuel exit orifice, in the upper portion, in fluid communication with the vehicle's engine and the purified fuel within the body.

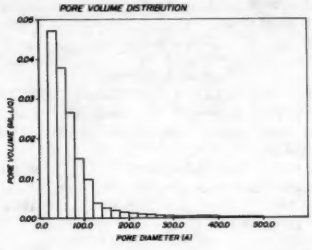
4,986,908

ORGANIC-BASED POROUS MICROSPHERES FOR HPLC

Richard W. Stout, and Henry J. Leibu, both of Wilmington, Del., assignors to E. I. du Pont de Nemours and Company, Wilmington, Del.

Division of Ser. No. 315,297, Feb. 24, 1989, Pat. No. 4,902,413, and a continuation of Ser. No. 191,220, May 6, 1988, abandoned. This application Jul. 31, 1989, Ser. No. 390,440
Int. Cl.[5] B01D *15/08*
U.S. Cl. 210—198.2 13 Claims

5. In an apparatus for use in chromatographic separation comprising a region through which materials to be separated are passed, the improvement wherein said region comprises a plurality of uniform-sized porous microspheres having an average diameter of about 0.5 to about 20 microns, substantially all of said microspheres having a diameter ranging from about 0.4 to 1.5 times the average diameter of the microspheres in said region, the said microspheres being an organic copolymer (a) selected from the group consisting of urea formaldehyde and melamine formaldehyde and (b) defining pores arranged in a uniform three dimensional lattice suitable for size exclusion chromatographic applications, said microspheres



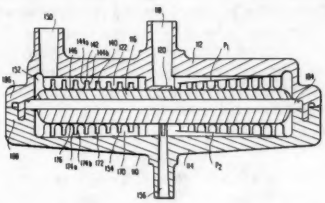
having a derivatized surface to which is attached functional groups useful in HPLC separations.

4,986,909

CHROMATOGRAPHY COLUMN

Vish Rai, Wallingford; Nils Dailey, N. Guilford; Kenneth Southall, Wethersfield; Timothy Webster, Norfolk; Gordon Leeke, Glastonbury, and Chaokang Chu, West Hartford, all of Conn., assignors to Cuno Incorporated, Meriden, Conn.

Continuation of Ser. No. 190,556, Apr. 5, 1988, abandoned, which is a continuation of Ser. No. 903,914, Sep. 4, 1986, Pat. No. 4,743,373, which is a continuation of Ser. No. 723,691, Apr. 16, 1985, Pat. No. 4,675,104, which is a continuation-in-part of Ser. No. 693,904, Jan. 23, 1985, abandoned, which is a continuation of Ser. No. 505,532, Jun. 17, 1983, Pat. No. 4,496,461. This application Jul. 21, 1989, Ser. No. 384,846
The portion of the term of this patent subsequent to Jan. 29, 2002, has been disclaimed.
Int. Cl.[5] B01D *15/08*
U.S. Cl. 210—198.3 15 Claims



1. A chromatography column for chromatographic separation of at least two components of a sample flowing therethrough comprising:

(1) a housing, the housing comprising:

(a) an inlet housing member having an outer periphery;

(b) an outlet housing member having an outer periphery;

(c) the inlet housing member and the outlet housing member overlying each other to define a stationary phase chamber;

(d) means for distributing the sample through the stationary phase chamber; and

(e) means for collecting the sample after the sample has flowed through the stationary phase chamber;

(2) a stationary phase within the chamber and having an outer periphery, the stationary phase comprising at least one layer of a swellable fibrous matrix in sheet form having chromatographic functionality and being effective for chromatographic separation and containing at the outer periphery thereof a thermoplastic polymeric material;

wherein the stationary phase outer periphery is between the

outer peripheries of the inlet and outlet housing members and forms a fluid tight mermetic thermoplastic seal between the outer peripheries of the inlet and outlet housing members formed by heating the outer periphery of the stationary phase.

4,986,910

APPARATUS FOR DEHYDRATING SLUDGE

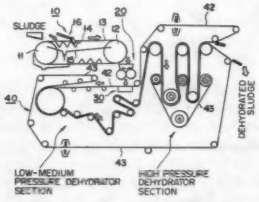
Kiyoshi Uyama, Kawasaki, and Yasuhiko Kihara, Yokohama, both of Japan, assignors to Nippon Kokan Kabushiki Kaisha, Tokyo, Japan

Division of Ser. No. 674,543, Nov. 26, 1984, Pat. No. 4,657,682. This application Jan. 14, 1987, Ser. No. 3,225

Claims priority, application Japan, Jun. 11, 1984, 59-119521; Jun. 11, 1984, 59-119522

Int. Cl.[5] B01D *36/00*

U.S. Cl. 210—251 **25 Claims**



1. An apparatus for dehydrating a wet sludge, comprising:

a preliminary dehydrator means for performing a preliminary dehydration of the wet sludge;

a pelletizer means coupled to said preliminary dehydrator means for pelletizing the sludge after the preliminary dehydration;

an excess water separator means coupled to said pelletizer means for removing the excess water content of the pellets of the sludge produced by said pelletizer means; and

a compression dehydrator means coupled to said excess water separator means and including an endless filter fabric for performing with said endless filter fabric a compression dehydration of the pellets from which the excess water content is removed.

4,986,911

DEWATERING PROCESS AND APPARATUS

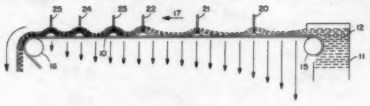
John Goron, Bridgewater; Ronald G. Renza, Middlesex; Robert J. Crosby, Bridgewater, and Erich W. Sodtalbers, Washington, all of N.J., assignors to Komline-Sanderson Engineering Corporation, Peapack, N.J.

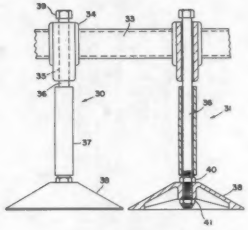
Filed Jul. 20, 1989, Ser. No. 382,279

Int. Cl.[5] B01D *33/68*

U.S. Cl. 210—396 **13 Claims**

1. In combination with a flight of a liquid permeable belt, a plow assembly for elevating and mixing a body of sludge on said flight of the liquid permeable belt, said plow assembly comprising a plow having a body the entirety of which is in the general form of a cone, said cone having a vertical axis and being located with the plane of its base at said belt and a side wall that extends upwardly away from said belt, and means for mounting said plow with respect to said belt, including a post extending horizontally across the path of said belt and a shaft interconnected to said post and extending downwardly from said post, said plow body being attached to said shaft at the downwardly extending end thereof so that in operative position an outer surface of said plow body side wall extends in a continuous, inwardly extending slope from its base at said belt to said shaft, whereby on movement of said belt toward and past said plow, the sludge carried on said belt flight will ride up on the side wall of said conical plow body, thereby elevating and disturbing the flow of sludge and mixing and agitating





same to increase the flow of liquid from said sludge to and through said liquid permeable belt.

4,986,912

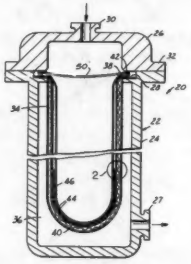
DISPOSABLE INSERT FOR A FLUID FILTRATION CANISTER

Alfred C. Fisch, Clarkston, Mich., assignor to Oakland Engineering, Inc., Pontiac, Mich.

Filed Jun. 16, 1989, Ser. No. 367,321

Int. Cl.[5] B01D *29/27*

U.S. Cl. 210—448 **14 Claims**



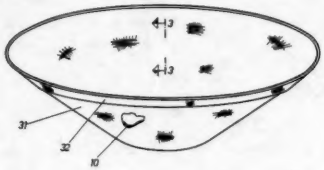
8. A disposable filter bag insert for use in a filter assembly that includes a canister having a generally cylindrical internal cavity formed by a cup-shaped base and a top removably received on said base, said base having a fluid outlet at a lower portion thereof and an upwardly facing shoulder at its lower portion thereof and an upwardly facing shoulder at its open end, said top having an inlet and periphery that overlies said shoulder, said disposable filter bag comprising:

a rigid annular ring of diameter to overlie said shoulder and be captured between said periphery and said shoulder, and a sock of sheet construction and having an open mouth affixed to said ring, a closed bottom, a vertical seam along one side thereof and an overall inner surface area exposed for flow-through filtration, said seam being undercut at an upper edge thereof and looped over said ring, said sock and ring being constructed for sealing engagement between said periphery of said top and said shoulder.

4,986,913
FILTER PAD

Helmut Schafft, Kellerstrasse 23, D-7074 Mogglingen, Fed. Rep. of Germany

Continuation of Ser. No. 915,227, Oct. 3, 1986, abandoned, which is a division of Ser. No. 696,454, Jan. 31, 1985, Pat. No. 4,647,415. This application Apr. 4, 1989, Ser. No. 333,796
Claims priority, application Fed. Rep. of Germany, Feb. 3, 1984, 3403738
Int. Cl.[5] B01D *29/58*
U.S. Cl. 210—490 12 Claims



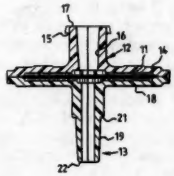
1. A filter pad comprising a multiplicity of adjacent layers (a to i; j to r; s to z) of different filtration properties ranging from coarse to progressively finer filter layers, wherein the course layer is a base layer and the progressively finer layers are successively deposited thereon whereby each progressively finer layer at least partially penetrates into pores of the immediately adjacent deposited layer thereby improving the surface bonding between adjacent layers, and said filter pad being rendered dimensionally stable by means of a binder material and being convertible to a filter packing by an in-situ removal of said binder material.

further comprising at least one layer that contains agents which enzymatically treat the medium to be filtered.

4,986,914
FILTER FOR PROTINACEOUS MATERIALS

Joseph Franks, Middlesex, England, assignor to Ion Tech Limited, Middlesex, England

Filed Aug. 4, 1989, Ser. No. 389,587
Claims priority, application United Kingdom, Aug. 4, 1988, 8818529; Aug. 15, 1988, 8819395
Int. Cl.[5] B01D *39/14*
U.S. Cl. 210—502.1 7 Claims

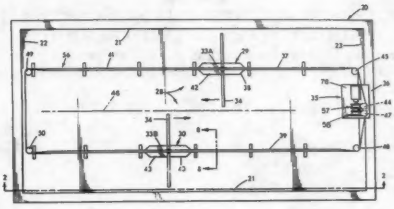


1. A filter body comprising a porous unitary element having on an outer surface thereof means for selectively removing, by adhesion, protinaceous materials from fluids passed through said porous unitary element, wherein said means for selectively removing protinaceous materials comprises a carbon selected from the group consisting of diamond-like carbon, glassy carbon and turbostratic carbon.

4,986,915
TAPE DRIVE WITH SELF-EXPANDING COILS FOR SLUDGE COLLECTOR

Charles L. Meurer, Golden, Colo., assignor to Baker Hughes Incorporated, Houston, Tex.

Division of Ser. No. 321,440, Mar. 9, 1989, Pat. No. 4,927,537. This application Mar. 9, 1990, Ser. No. 491,566
Int. Cl.[5] B01D *21/20, 21/04*
U.S. Cl. 210—527 7 Claims



1. In an apparatus for moving equipment in a clarifier basin provided with a track and a carriage movable on said track for carrying said equipment, said carriage having a first end and a second end, the improvement comprising:

a first thin metal tape attached to said first end of said carriage, said first tape having a characteristic of resisting being rolled into a first coil such that said first tape tends to uncoil itself;

a second thin metal tape attached to said second end of said carriage, said second tape having a characteristic of resisting being rolled into a second coil such that said second tape tends to uncoil itself;

a first reel having a first hub secured to said first tape for forming said first coil in said first tape;

a second reel having a second hub secured to said second tape for forming said second coil in said second tape;

a drum releasably secured to each of said first and second reels for rotating said first and second reels clockwise to wind said first tape on said first hub and unwind said second tape from said second hub, said drum also rotating said first and second reels counterclockwise to wind said second tape on said second hub and unwind said first tape from said first hub;

said unwound first and second tapes tending to uncoil themselves to form said respective first and second coils having increased diameters to apply tension on said respective first and second tapes tending to pull said tapes toward their respective reels;

a first retainer strap extending around a portion of said first reel in engagement with said first coil that has said increased diameter for retaining said first coil on said first reel; and

a second retainer strap extending around a portion of said first reel in engagement with said second coil that has said increased diameter for retaining said second coil on said second reel;

said tendency of said first tape to uncoil being effective to apply tension to said first tape that applies a resistive force to said first end of said carriage;

said tendency of said second tape to uncoil itself being effective to apply tension to said second tape that applies a resistive force to said second end of said carriage;

said winding of said first tape on said first hub being effective to overcome said resistive force on said second end of said carriage and move said carriage in a first direction on said track, said carriage moving in said first direction being effective to unwind some of said second coil from said second reel as said clockwise rotation of said second reel permits said second coil to uncoil itself and apply said tension to said second tape; and

said winding of said second tape on said second hub being

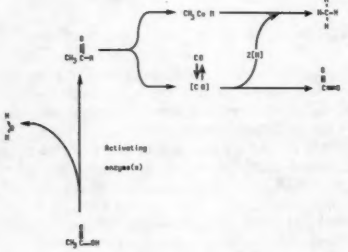
effective to overcome said resistive force on said first end of said carriage and move said carriage in a second direction on said track, said carriage moving in said second direction being effective to unwind some of said first coil from said first reel as said counterclockwise rotation of said first reel permits said first coil to uncoil itself and apply said tension to said first tape.

4,986,916

METHOD OF MONITORING AND/OR CONTROLLING BIOLOGICALLY CATALYZED REACTIONS

Robert F. Hickey, Haydenville, Mass., assignor to New York State Energy Research and Development Authority, Albany, N.Y.

Filed Jan. 19, 1988, Ser. No. 145,774
Int. Cl.[5] C02F *3/12*
U.S. Cl. 210—603 **20 Claims**



1. A method of monitoring a biologically catalyzed reaction, comprising the steps of:

determining a trace gas which either is a metabolic intermediate produced during said reaction or equilibrates with a metabolic intermediate produced during said reaction;

measuring the concentration of said trace gas evolving from said reaction; and

using the concentration measurement to assess the metabolic status of the reaction via a deterministic relationship.

4,986,917

SELECTIVE RECOVERY OF A NITROPHENOLIC BY-PRODUCT FROM NITRATION WASTE WATER BY EXTRACTION

Earl G. Adams, Grand Bay, Ala.; Arthur C. Bayer, Ocean Springs, Miss.; Alan D. Farmer, Biloxi, Miss., and Brenda J. Hook, Gautier, Miss., assignors to First Chemical Corporation, Pascagoula, Miss.

Filed Jul. 10, 1989, Ser. No. 377,048
Int. Cl.[5] C02F *1/26*
U.S. Cl. 210—634 **17 Claims**

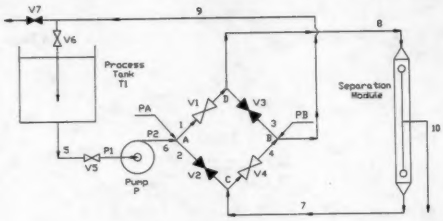
12. A process for selectively recovering a nitrophenolic by-product being from nitration waste water, said nitrophenolic by-product being a member of the group consisting of isometric dinitrocresols, 2,4-dinitrophenol, and picric acid comprising controlling the pH of said nitration waste water within the pH range of from about 4.5 to 0.5 through the addition of sulfuric acid to said nitration waste water to influence the solubility of said nitrophenolic by-product and separating said nitrophenolic by-product from said nitration waste water by solvent extraction, wherein said controlling of pH and said separating of said nitrophenolic by-product from said nitration waste water is carried out in such a manner that said dinitrocresols are recovered first, said 2,4-dinitrophenol is recovered second in substantially pure form and said picric acid is recovered third in substantially pure form.

4,986,918

MEMBRANE SEPARATION SYSTEM AND METHOD OF OPERATION

Barry R. Breslau, Acton, Mass., and John Sleyers, Breda, Netherlands, assignors to Romicon Inc., Woburn, Mass.

Filed Nov. 8, 1989, Ser. No. 433,888
Int. Cl.[5] B01D *65/02*
U.S. Cl. 210—652 **10 Claims**



1. An apparatus for conducting separations comprising:

(a) one or more separation modules;

(b) a pressure means with an inlet and an outlet, said pressure means connected to a loop comprised of four conduit junctions A, B, C and D connected together by four valved conduits and junction A is connected to junctions D and C and is further connected to a valved inlet feed stream conduit and a conduit to the inlet of said pressure means, junction B is connected to junctions D and C and is further connected by conduit to the outlet of said pressure means and to a valved discharge conduit, junction D is connected to junctions A and B and is further connected by conduit to one end of the separation module on the process side, and junction C is connected to junctions A and B and is further connected to the second end of the separation module on the process side and said loop is for introducing fluid under positive pressure in both forward flow and reverse flow directions to said separation modules and for providing negative pressure on the inlet and outlet side of said separation modules; and

(c) a means to take off permeate from said separation modules.

6. A method of separating solutes, colloidal particles and suspended matter from a solution or suspension of such matter comprising:

(a) connecting a pump to a loop comprised of four conduit junctions A, B, C and D connected together by four valved conduits and junction A is connected to junctions D and C and is further connected to a valved inlet feed stream conduit and a conduit to the inlet of said pump, junction B is connected to junctions D and C and is further connected by conduit to the outlet of said pump and to a valved discharge conduit, junction D is connected to junctions A and B and is further connected by conduit to one end of separation module on the process side, and junction C is connected to junctions A and B and is further connected to the second end of said separation module on the process side;

(b) pumping said solution or suspension into said valved conduit loop at conduit junction B, out of said valved conduit loop at conduit junction D, through said separation module and back to said valved conduit loop at conduit junction C;

(c) reversing the flow by pumping said solution or suspension into said valved conduit loop at conduit junction B, out of said valved conduit loop at conduit junction C, through said separation module and back to said valved conduit loop at conduit junction D;

(d) recovering concentrate containing solutes, colloidal particles or suspended matter;

(e) withdrawing permeate from said separation module; and

(f) cleaning said separation module by applying negative pressure to the process side of said separation module and

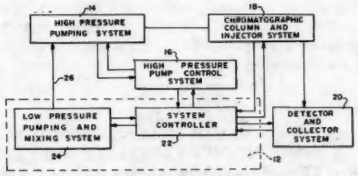
thereby drawing filtrate from the filtrate side of said separation module into the process side of said module, into said valved conduit loop at conduit junction D, conduit junction C or a combination thereof, through valved conduit junction A, into said pump and out of said valved conduit loop at conduit junction B.

4,986,919

CHROMATOGRAPHIC PUMPING METHOD

Robert W. Allington, Lincoln, Nebr., assignor to Isco, Inc., Lincoln, Nebr.

Division of Ser. No. 99,387, Sep. 21, 1987, Pat. No. 4,869,374, which is a division of Ser. No. 838,295, Mar. 10, 1986, Pat. No. 4,733,152. This application May 22, 1989, Ser. No. 355,683
The portion of the term of this patent subsequent to Jan. 1, 2008, has been disclaimed.
Int. Cl.[5] B01D *15/08*
U.S. Cl. 210—656 19 Claims


HIGH PRESSURE PUMPING SYSTEM
CHROMATOGRAPHIC COLUMN AND INJECTOR SYSTEM
HIGH PRESSURE PUMP CONTROL SYSTEM
LOW PRESSURE PUMPING AND MIXING SYSTEM
SYSTEM CONTROLLER
DETECTOR AND COLLECTOR SYSTEM

1. A method of operating a chromatograph in a constant flow rate mode comprising the steps of:

selecting a rate of flow of liquid into a column;

representing the flow rate in a digital code in terms of a number of pulses for each cycle of a reciprocating pump;

measuring the rate of movement of a piston in the reciprocating pump only in the direction in which it is pumping liquid into a chromatographic column;

filling the cylinder of the reciprocating pump in a stroke in a return direction of the piston with effluent to be pumped into the chromatographic column with a motion in the return direction being controlled by a motor which accelerates starting at a time during the return cycle and ending at a time during a pumping stroke related to the preset rate of flow into the chromatographic column, wherein the rate of acceleration is controlled from a sample and hold circuit representing the motor current;

adjusting the signal in the sample and hold circuit by a value set empirically to avoid cavitation;

the signal being applied to a motor driver circuit to accelerate the motor for a predetermined time controlled by a timer set by the rate of flow; and

causing the flow from the pump to communicate with the inlet of a chromatographic column, whereby a relatively smooth and constant flow of influent into the column is provided.

4,986,920

SELECTIVE RECOVERY OF A NITROPHENOLIC BY-PRODUCT FROM NITRATION WASTE WATER BY PRECIPITATION

Earl G. Adams, Grand Bay, Ala.; Arthur C. Bayer, Ocean Springs, Miss.; Alan D. Farmer, Biloxi, Miss., and Brenda J. Hook, Gautier, Miss., assignors to First Chemical Corporation, Pascagoula, Miss.

Filed Jul. 10, 1989, Ser. No. 377,105
Int. Cl.[5] C02F *1/26*
U.S. Cl. 210—710 6 Claims

5. A process for selectively recovering a nitrophenolic by-product from nitration waste water by precipitation, said nitrophenolic by-product being a member of the group consisting of 2,4-dinitrophenol and picric acid comprising controlling the pH of said nitration waste water within the pH range of from about 4.0 to 0.5 through the addition of sulfuric acid to said nitration waste water to influence the solubility of said nitrophenolic by-product causing said nitrophenolic by-product to crystalize out of said nitration waste water, wherein said controlling of the pH is carried out in such a manner that said 2,4-dinitrophenol is recovered first in substantially pure form followed by recovering said picric acid in substantially pure form.

4,986,921

CELLULOSE ACETATE BOUND PHOTOSENSITIZER FOR PRODUCING SINGLET OXYGEN

Stephen F. Yates, Arlington Heights, Ill.; Mary L. Good, Convent Station, N.J., and Inara M. Brubaker, Des Plaines, Ill., assignors to Allied-Signal Inc., Morris Township, Morris County, N.J.

Division of Ser. No. 287,318, Dec. 20, 1988. This application Aug. 29, 1990, Ser. No. 574,624
Int. Cl.[5] C02F *1/70;* G03G *15/00, 5/00, 15/06*
U.S. Cl. 210—758 9 Claims

1. A method of oxidizing undesirable oxidizable compounds present in a hydrocarbon or aqueous fraction comprising contacting the hydrocarbon or aqueous fraction with a cellulose acetate bound photosensitizer in the presence of molecular oxygen and light, thereby oxidizing the oxidizable compound with singlet oxygen which is generated from molecular oxygen by energy transfer from the light and the cellulose acetate bound photosensitizer to produce a treated hydrocarbon or aqueous fraction.

4,986,922

SOFTENING COMPOSITIONS INCLUDING QUATERNARY AMMONIUM FUNCTIONAL SILOXANES

Steven A. Snow, and Linda M. Madore, both of Midland, Mich., assignors to Dow Corning Corporation, Midland, Mich.

Filed Apr. 4, 1990, Ser. No. 504,484
Int. Cl.[5] C06M *13/322, 13/513, 1/62;* C07F *7/10*
U.S. Cl. 252—8.8 22 Claims

1. A softening composition comprising a mixture of at least one surfactant which is anionic and a silicone compound having the formula

$$[(R_3SiO)_2—SiR—(CHR'')_a]_bN^+R'_{4-b}X^-$$

wherein R is an alkyl radical having one to six carbon atoms; R' is an alkyl or aryl radical having one to eighteen carbon atoms; R'' is hydrogen or R'; X is chloride, bromide, iodide, nitrate, or RSO_4^-; a is an integer having a value from one to ten; and b is an integer having a value of two or three.

4,986,923

FRONT-WHEEL DRIVE GREASE WITH SYNERGISTIC SULFATE AND CARBONATE ADDITIVE SYSTEM

John A. Waynick, Bolingbrook, Ill., assignor to Amoco Corporation, Chicago, Ill.

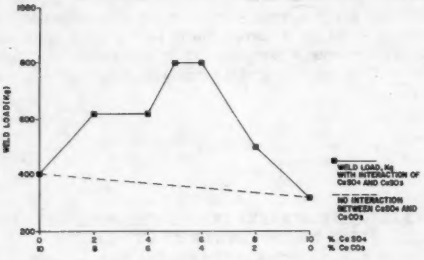
Filed Jun. 27, 1989, Ser. No. 371,913
Int. Cl.[5] C10M *125/10, 125/22*
U.S. Cl. 252—25 21 Claims

1. A lubricating grease, comprising:

a thickener;

a base oil;

a sufficient amount of an additive package to impart extreme pressure and wear resistant properties to said lubricating



grease, said additive package comprising a sulfate and a carbonate in the absence of halogenated compounds.

4,986,924

POLYMERIC COMPOUNDS ESPECIALLY USEFUL AS ADDITIVES TO LUBRICANTS AND COMPOSITIONS CONTAINING SAID COMPOUNDS

Laurent Germanaud, Irigny; Nguyen Truong Dinh; Gilbert Marie, both of Pau, and Patrick Turello, Francheville, all of France, assignors to Societe Nationale Elf Aquitaine, Paris, France

Filed Nov. 3, 1988, Ser. No. 266,946
Claims priority, application France, Nov. 5, 1987, 87 15347
Int. Cl.[5] C10M *133/56*
U.S. Cl. 252—51.5 A 21 Claims

1. Polymeric compounds comprised of the condensation produce of (1) a primary amine having one phenolic group in its molecule and (2) a copolymer of a carboxylic acid, said copolymer formed by (a) copolymerization of an unsaturated monocarboxylic acid and at least one ester of said acid or by (b) grafting an unsaturated acid on a hydrocarbon polymer.

4,986,925

CORROSION INHIBITORS AND DEICING AGENTS

Larry B. Fiske, Orting, Wash., assignor to Georgia-Pacific Resins, Inc., Atlanta, Ga.

Filed Aug. 10, 1989, Ser. No. 392,066
Int. Cl.[5] C09K *3/18, 5/00*
U.S. Cl. 252—70 16 Claims

1. A process for deicing ice or snow-covered surfaces with reduced corrosivity, said process comprising:

applying to a surface a deicing composition comprising: (1) an alkali and/or alkaline earth metal chloride; and (2) a lignosulfonate; and (3) an effective amount of a corrosion reducing additive salt of aluminum, antimony, cadmium, cobalt, manganese, nickel, zinc, and combinations thereof.

4,986,926

THICKENED ALKALI METAL HYPOCHLORITE COMPOSITIONS

Eugene Hoffman, Cincinnati, Ohio, assignor to The Drackett Company, Cincinnati, Ohio

Filed Apr. 10, 1989, Ser. No. 336,566
The portion of the term of this patent subsequent to May 9, 2006, has been disclaimed.
Int. Cl.[5] C11D *7/54*
U.S. Cl. 252—102 17 Claims

1. A phase stable, thickened, aqueous bleach composition of given ionic strength having a shelf half-life of at least three months comprising an aqueous solution of an alkali metal hypochlorite, an alkali metal hydroxide, a thickening additive present in the composition in an amount effective to impart to the bleach composition a viscosity of at least about 25 cps., the thickening additive consisting correspondingly of (A) from 0 to 100% of an alkali metal salt of an N-alkyl, N-fatty acyl amino acid and (B) from 100 to 0% of an alkali metal salt of an alkyl sulfate, and from about 0.1 to about 15% of a surfactant other than components (A) and (B) of the thickening additive and which does not materially raise the viscosity of a composition not containing said surfactant, the surfactant being selected from the group consisting of anionic, nonionic and amphoteric surfactants, with the proviso that alkali metal sulfate salts of ethoxylated aliphatic alcohols included in the composition comprise less than about 2.5% by weight of the total weight of component (A), component (B) and said salt of the ethoxylated alcohol, the phase stability of the bleach composition being a function of the bleach composition ionic strength and the composition of the thickening additive such that at a given concentration of component (A) in the thickening additive a phase stable bleach composition is obtained at a bleach composition ionic strength equal to or less than a maximum value, the inclusion of less than said given concentration of component (A) in the thickening additive or an increase in ionic strength of the bleach composition above the maximum value generally causing the bleach composition of said given concentration of component (A) in the thickening additive and having said maximum ionic strength into two phases.

4,986,927

SPOT AND STAIN REMOVER CONTAINING A MAJOR AMOUNT OF A VEGETABLE OIL

Lyle Elton, 5 Eagle Drive, Sherwood Park, Alberta, Canada T8A 0E1

Filed Jan. 16, 1990, Ser. No. 466,013
Int. Cl.[5] C11D *1/655, 3/382, 9/38, 9/48*
U.S. Cl. 252—118 2 Claims

1. A spot and stain remover composition consisting essentially of 55 to 65% by weight vegetable oil, 26 to 32% by weight water, 0.03 to 0.05% by weight formaldehyde, 1.5 to 1.7% by weight sodium xylene sulphonate, 1.5 to 1.7% by weight of the sodium salt of ether sulphate, 1.5 to 1.9% by weight of a 45% aqueous solution of potassium hydroxide, 4.3 to 4.5% by weight sulphonic acid, and 1.1 to 1.3% by weight lauryl alkanolamide.

4,986,928

BINARY AZEOTROPIC COMPOSITIONS OF 1-CHLORO-1,2,2-TRIFLUOROCYCLOBUTANE AND METHANOL

Abid N. Merchant, Wilmington, Del., assignor to E. I. Du Pont de Nemours and Company, Wilmington, Del.

Filed Mar. 21, 1990, Ser. No. 496,917
Int. Cl.[5] C11D *7/30, 7/50;* C09K *3/30;* C23G *5/28*
U.S. Cl. 252—171 12 Claims

1. An azeotropic composition consisting essentially of about 67–77 weight percent 1-chloro-1,2,2-trifluorocyclobutane and about 23–33 weight percent methanol, said composition having a boiling point of about 56.5 C. when the pressure on such composition is adjusted to substantially atmospheric pressure.

4,986,929

NOVEL ISOCYANATE BLENDS

Gregory D. Williams, Pittsburgh, Pa., assignor to Mobay Corporation, Pittsburgh, Pa.

Continuation of Ser. No. 398,201, Aug. 23, 1989, abandoned.
This application May 14, 1990, Ser. No. 523,142
Int. Cl.[5] C08G *18/10, 18/12*
U.S. Cl. 252—182.22 7 Claims

1. An isocyanate blend having an isocyanate group content of from about 16 to about 25% by weight and consisting essentially of:

(A) a modified isocyanate having an isocyanate group content of from about 18 to about 25% by weight and prepared by reacting 1 mole of methylenebis(phenyl isocyanate) with from about 0.1 to about 0.3 moles of a 134 to

700 molecular weight poly-1,2-propylene ether glycol, and

(B) an isocyanate having an isocyanate group content of from about 16 to about 22% by weight and prepared by reacting:

(i) from about 50 to about 60 parts by weight of methylenebis(phenyl isocyanate),

(ii) from about 4 to about 8 parts by weight of a carbodiimide group modified methylenebis(phenyl) isocyanate) having an isocyanate group content of from about 28 to about 31% by weight, and

(iii) from about 35 to about 41 parts by weight of a polyester diol having a molecular weight of from about 1000 to about 3000, with the amounts of (i), (ii) and (iii) totaling 100 parts by weight, the weight ratio of (A) to (B) being from 10:1 to 1:10.

4,986,930

POLYOL-BLOWING AGENT COMPOSITIONS WITH IMPROVED STORAGE STABILITY

Earl A. E. Lund, West Seneca; Robert G. Richard, Cheektowaga; Ian R. Shankland, and David P. Wilson, both of Williamsville, all of N.Y., assignors to Allied-Signal Inc., Morris Township, Morris County, N.J.

Filed Oct. 3, 1988, Ser. No. 251,730

Int. Cl.[5] G08J *9/02*

U.S. Cl. 252—182.24 **4 Claims**

1. Premixes comprising a polyol suitable for polyurethane or polyisocyanurate foam preparation and 1,1-dichloro-1-fluoroethane in proportions suitable for polyurethane or polyisocyanurate foam preparation.

3. Mixtures consisting essentially of a polyol suitable for polyurethane or polyisocyanurate foam preparation and 1,1-dichloro-1-fluoroethane in proportions suitable for polyurethane or polyisocyanurate foam preparation.

4,986,931

CYCLOHEXANE DERIVATIVES

Rudolf Eidenschink, Dieburg; Günther Haas, Neckargemünd; Ludwig Pohl, Darmstadt; Michael Römer, Rodgau; Bernhard Scheuble, Alsbach, and Georg Weber, Erzhausen, all of Fed. Rep. of Germany, assignors to Merck Patent Gesellschaft mit beschränkter Haftung, Darmstadt, Fed. Rep. of Germany

Division of Ser. No. 12,691, Feb. 9, 1987, which is a division of Ser. No. 700,860, Feb. 12, 1985, abandoned, which is a division of Ser. No. 526,927, Aug. 26, 1983, Pat. No. 4,510,069, and Ser. No. 35,548, Apr. 7, 1987, which is a continuation of Ser. No. 705,811, Feb. 26, 1985, abandoned, which is a continuation-in-part of Ser. No. 526,927, Aug. 26, 1983, Pat. No. 4,510,069. This application May 26, 1987, Ser. No. 53,908

Claims priority, application Fed. Rep. of Germany, Aug. 26, 1982, 3231707; Jun. 3, 1983, 3320024; Feb. 27, 1984, 3407013

The portion of the term of this patent subsequent to Apr. 9, 2002, has been disclaimed.

Int. Cl.[5] C09K *19/30*

U.S. Cl. 252—299.63 **4 Claims**

1. In a liquid crystal dielectric useful for electrooptical display elements and comprising at least two liquid crystal components, at least one of which comprises at least one 1,4-cyclohexylene ring, the improvement wherein one 1,4-cyclohexylene ring is additionally substituted in the 1-position, the 4-position or the 1,4-position by alkyl, alkoxy, fluorinated alkyl or fluorinated alkoxy, each of 1-5 C atoms, F, Cl, Br, CN or a combination thereof and is optionally also substituted by 1 or 2 of F, Cl, Br, CN or a combination thereof.

4,986,932

STABILIZER SYSTEM FOR POLYOLEFINS COMPRISED OF MONOCARBOXYLIC ACID ESTERS OF A PIPERIDINOL AND A BENZOPHENONE OR BENZOTRIAZOLE

Josef Disteldorf, Marl; Hans-Jurgen Haage; Hubert Libera, both of Herne, and Peter Kirchner, Bochum, all of Fed. Rep. of Germany, assignors to Huels Aktiengesellschaft, Marl, Fed. Rep. of Germany

Filed Jun. 15, 1988, Ser. No. 206,802

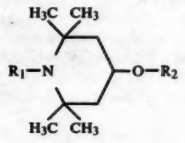
Claims priority, application Fed. Rep. of Germany, Jul. 22, 1987, 3724223

Int. Cl.[5] C08J *7/06*

U.S. Cl. 252—403 **14 Claims**

1. A stabilizer system for stabilization of polyolefins against light, heat, and oxidative degradation, comprising:

(a) a monocarboxylate ester of a polyalkyl-4-piperidinol of the formula:



wherein R_1 represents hydrogen a C_{1-5} alkyl group, an allyl or benzyl-group, or a C_{1-4} acyl group, and R_2 represents a straight or branched chain saturated or unsaturated C_{16-24} aliphatic carboxylic acyl group; and

(b) a benzophenone or benzotriazole UV-absorber.

12. A method for stabilizing polyolefins against light, heat and oxidative degradation comprising incorporating into the polyolefin an effective amount of the stabilizer system of claim 1.

4,986,933

RESISTOR COMPOSITION

Eiichi Asada, Tokyo; Mikio Yamazoe, Hamuramachi, and Shigeru Matsumura, Oume, all of Japan, assignors to Shoei Chemical Inc., Tokyo, Japan

Filed Mar. 21, 1990, Ser. No. 496,968

Claims priority, application Japan, Mar. 31, 1989, 1-82569

Int. Cl.[5] H01C *7/00, 8/00*

U.S. Cl. 252—518 **4 Claims**

1. An electrical resistor composition comprising at least one electrically conductive powder selected from the group consisting of (a) tin oxide powder and (b) powder resulting from heat treatment of tin oxide and tantalum oxide, a glass frit and a double oxide of tantalum and at least one metal selected from the group consisting of alkali metals, alkaline earth metals, gallium, indium, tin, antimony and transition metals other than tantalum.

4,986,934

PHOTOCHROMIC COMPOUND AND ARTICLES CONTAINING THE SAME

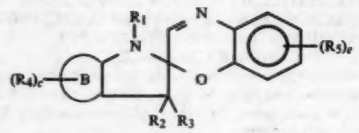
Patricia L. Kwiatkowski, Akron, and David B. Knowles, Wadsworth, both of Ohio, assignors to PPG Industries, Inc., Pittsburgh, Pa.

Continuation of Ser. No. 173,229, Mar. 25, 1988, abandoned. This application Dec. 21, 1988, Ser. No. 288,051

Int. Cl.[5] G02B *5/23*; C07D *498/20*

U.S. Cl. 252—586 **26 Claims**

1. A compound represented by the following graphic formula:



wherein ring B is a pyridine ring fused to the pyrrolo segment of the compound and wherein,

(a) R_1 is selected from the group consisting of C_1–C_8 alkyl, allyl, acrylyl(C_2–C_6)alkyl, methacrylyl(C_2–C_6)alkyl, carboxy(C_2–C_6)alkyl, cyano(C_2–C_6)alkyl, C_1–C_4 acyloxy-(C_2–C_6)alkyl, hydroxy(C_2–C_6)alkyl, $(C_2H_4O)_m$-CH_3, and C_1–C_3 alkoxy(C_1–C_3)alkyl, m being a number from 1 to 6;

(b) R_2 and R_3 are each selected from the group consisting of C_1–C_5 alkyl, phenyl, and mono- and di-substituted phenyl, benzyl or combine to form a cyclic ring selected from the group consisting of an alicyclic ring containing from 6 to 8 carbon atoms (including the spiro carbon atom), norbornyl and adamantyl, said phenyl substituents being selected from C_1–C_4 alkyl and C_1–C_5 alkoxy;

(c) R_4 is selected from the group consisting of C_1–C_5 alkyl, and C_1–C_5 alkoxy;

(d) R_5 is selected form the group consisting of C_1–C_5 alkyl, and C_1–C_5 alkoxy; and

(e) the letters "c" and "e" are integers of from 0–1 and 0–3 respectively.

4,986,935

WAVELENGTH CONVERTING DEVICE

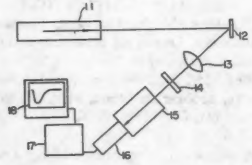
Kentaro Ageishi, and Lyong S. Pu, both of Kanagawa, Japan, assignors to Fuji Xerox Co., Ltd., Tokyo, Japan

Continuation of Ser. No. 308,859, Feb. 9, 1989, abandoned. This application Dec. 15, 1989, Ser. No. 451,157

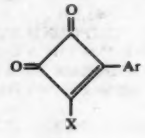
Claims priority, application Japan, Feb. 10, 1988, 63-27435

Int. Cl.[5] F21V *9/04*

U.S. Cl. 252—587 **7 Claims**



1. In a device for converting the wavelength of light emitted by a light source to a second wavelength comprising a light source for emitting light and an organic compound disposed in the path of the emitted light the improvement wherein said organic compound is a II-electron conjugated compound having a 1,2-cyclobutenedione ring as an electron-withdrawing substituent and being represented by formula (I)



(I)

where Ar represents the residue of a π-electron conjugated molecule; and X represents a hydroxyl group, an alkoxy group, or a halogen atom, said II-electron conjugated compound being capable of reducing the wavelength of the emitted laser light to a second wavelength utilizing second harmonic wave generation.

4,986,936

VARNISH REMOVING COMPOSITION AND METHODS OF USING THE SAME

Richard C. Wolbers, Four Furness La., Wallingford, Pa. 19086

Filed Jun. 17, 1988, Ser. No. 208,341

Int. Cl.[5] C11D *3/20, 10/02*

U.S. Cl. 252—170 **15 Claims**

1. A varnish removing aqueous solution comprising a first ketone solvent, a second solvent selected from the group consisting of an aromatic compound, cyclohexanol, methyl cyclohexanol and pyridine, a gelling agent and a gelling agent activator selected from the group consisting of cationic surfactant, nonionic surfactant and simple organic base, the gelling agent being present in an amount of about 0.5% to about 2.0% by weight relative to the solvents, and the ratio of gelling agent activator to gelling agent being about 2.0:1 to about 50.0:1 by weight.

4,986,937

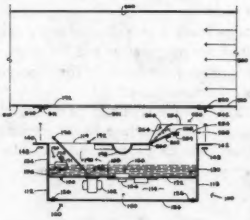
CENTRAL AIR DUCT SCOOPER HUMIDIFIER

George Sorio, 205 W. 53rd Ter., Kansas City, Mo. 64110

Filed Aug. 23, 1989, Ser. No. 397,271

Int. Cl.[5] B01F *3/04*

U.S. Cl. 261—81 **11 Claims**



1. An air humidification system comprising:

a housing;

an inlet air compartment mounted on said housing;

an inlet in said compartment for entry of an air stream passing through an air duct of a home heating system;

a water reservoir in said housing;

means for delivering water to said reservoir;

a fog chamber in communication with said water reservoir;

fogging means in said housing and extending into said reservoir;

circuit means for energizing said fogging means, said fogging means interacting with said housing and extending into said reservoir;

circuit means for energizing said fogging means, said fogging means interacting with said water for creating a fog in said fog chamber upon closure of a normally open switch in said inlet air compartment responsive to a magnetic field;

means for mounting said housing to said air duct with said air compartment in communication with said air duct, said air stream passing through said duct and through said inlet;

means for directing said air stream to said fog chamber for interaction with said fog to humidify said air stream, said directing means including a panel in said inlet air compartment;

an outlet in said housing and in communication with said air duct and fog compartment, said humidified air stream being discharged through said outlet and into said duct;

a magnet mounted to said panel;

means for mounting said panel in said inlet air compartment between a first position in which said magnet is adjacent said switch and a second position displacing said magnet from said switch;

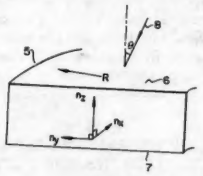
said air stream passing through said inlet moving said panel and magnet to said first position for closure of said switch, whereby said circuit means energizes said fogging means.

4,986,938

PROCESS FOR PRODUCING PLASTIC SUBSTRATE FOR OPTICAL DISKS

Akihiro Izuka; Yoshio Onizawa, Hyogo, and Mitsuru Yamashita, all of Himeji, Japan, assignors to Daicel Chemical Industries Ltd., Osaka, Japan

Division of Ser. No. 19,720, Feb. 27, 1987, Pat. No. 4,841,501.
This application Apr. 14, 1989, Ser. No. 338,834
Claims priority, application Japan, Mar. 3, 1986, 61-45900
Int. Cl.[5] B29D *11/00*; B29C *45/03*
U.S. Cl. 264—1.3 8 Claims



1. A process for molding a transparent plastic substrate for a recording medium, comprising the steps of:

(a) injecting into a molding cavity a resin which possesses anisotropy of refractive index when solidified;

(b) filling said molding cavity with the injected resin; and

(c) increasing the pressure on the resin in the molding cavity after completion of the filling step and after the surface of the resin in the molding cavity has solidified but before the inside of the molten resin in the molding cavity has solidified, said pressure being increased sufficiently so as to obtain a molded transparent plastic substrate having two parallel flat surfaces wherein the absolute differences in the refractive indexes satisfy the following inequalities:

$|n_z - n_x| < 4 \times 10^{-4}$, and

$|n_z - n_y| < 4 \times 10^{-4}$,

wherein n_z is the refractive index in the direction perpendicular to the flat surfaces of the transparent plastic substrate, and n_x and n_y are the refractive indexes in the directions parallel to the flat surfaces of the transparent plastic substrate.

4,986,939

METHOD FOR THE PRODUCTION OF CYLINDRICALLY SYMMETRIC BODIES WITH A RADIAL GRADIENT

Hans-Jurgen Hoffmann, Konstantinweg, Fed. Rep. of Germany, assignor to Schott Glaswerke, Mainz, Fed. Rep. of Germany

Filed May 20, 1987, Ser. No. 52,055
Claims priority, application Fed. Rep. of Germany, May 23, 1986, 3617363
Int. Cl.[5] B29C *53/14*; C03B *37/025*
U.S. Cl. 264—1.7 17 Claims

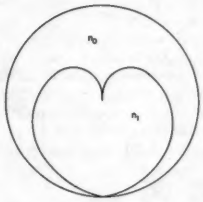
1. A method of producing a cylindrically symmetrical body having a radial gradient of material properties, comprising:

providing a least two rod-shaped molded bodies, said bodies being of materials which have different physical properties,

uniting said bodies in parallel,

lowering the viscosity of said bodies so that said bodies are temporarily converted to plastically deformable states of approximately equal viscosity while said bodies are maintained in parallel, wherein said step of lowering the viscosity of said bodies comprises thermally treating said bodies at an elevated temperature,

thereafter twisting said bodies about a longitudinal axis so that a desired radial gradient of the material properties is achieved,



maintaining for a limited time said twisted bodies at a temperature slightly lower than the temperature chosen for said step of thermally treating said bodies, whereby the homogeneity of said twisted bodies is improved, and resolidifying said twisted bodies.

4,986,940

CURING PROCESS FOR THE MANUFACTURE OF THERMOPLASTIC ELASTOMER BINDERS

C. Richard Costin, West Chester, and Michael A. Bailey, Boothwyn, both of Pa., assignors to Sartomer Company, Inc., Exton, Pa.

Filed Nov. 6, 1989, Ser. No. 432,085
Int. Cl.[5] C06B *45/10, 21/00*
U.S. Cl. 264—3.1 3 Claims

1. A method of making solid propellants from thermoplastic elastomer binders and energetic materials consisting essentially of

(a) forming a blend of macromolecular monomers, prepared by anionic polymerization of one or more vinyl aromatic compounds and terminated with an acrylate or methacrylate group, and monomers selected from alkyl acrylates, alkoxyalkyl acrylates, diacrylate monomers, and mixtures thereof;

(b) mixing into the above blend suitable energetic materials selected from solid oxidizers, solid fuels, a cyclic nitramines, and mixtures of these;

(c) forming the mixture of (a) and (b) into a suitable shape; and

(d) subjecting the shaped mixture of (c) to an electron beam with a dose level of between 3 and 12 mrads until the composition is completely cured.

4,986,941

SHOTTING APPARATUS AND PROCESS

Loren E. Hendrix, Webster, and Alan B. Mistrater, Fairport, both of N.Y., assignors to Xerox Corporation, Stamford, Conn.

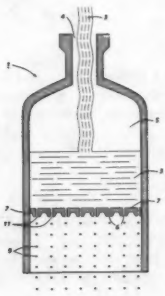
Filed Jul. 2, 1990, Ser. No. 548,460
Int. Cl.[5] B29B *9/10*
U.S. Cl. 264—13 18 Claims

1. A shotting apparatus which comprises a chamber for containing a molten material and a plate with a plurality of orifices through which the molten material can pass to form droplets, wherein the molten material in the chamber first contacts the top surface of the plate and wherein the bottom surface of the plate contains protrusions through which the orifices extend, the length of each protrusion being at least 50 percent of the total length of the orifice passing through the protrusion, wherein the apparatus is of a material selected from the group consisting of silicon carbide and an alloy comprising

nickel in an amount of from about 50 to about 70 percent by weight, molybdenum in an amount of from about 11 to about 22 percent by weight, chromium in an amount of from about 11 to about 22 percent by weight, iron in an amount of from 0 to about 10 percent by weight, tungsten in an amount of from 0 to about 10 percent by weight, manganese in an amount of from 0 to about 1 percent by weight, and silicon in an amount of from 0 to about 1 percent by weight.

7. A process of preparing solid spherical shots from a molten material which comprises:

a. providing a shotting apparatus which comprises a chamber for containing a molten material and a plate with a plurality of orifices through which the molten material can pass to form droplets, wherein the molten material in the chamber first contacts the top surface of the plate and wherein the bottom surface of the plate contains protrusions through which the orifices extend, the length of each



protrusion being at least 50 percent of the total length of the orifice passing through the protrusion, wherein the apparatus is of a material selected from the group consisting of silicon carbide and an alloy comprising nickel in an amount of from about 50 to about 70 percent by weight, molybdenum in an amount of from about 11 to about 22 percent by weight, chromium in an amount of from about 11 to about 22 percent by weight, iron in an amount of from 0 to about 10 percent by weight, tungsten in an amount of from 0 to about 10 percent by weight, manganese in an amount of from 0 to about 1 percent by weight, and silicon in an amount of from 0 to about 1 percent by weight;

b. introducing a molten material into the shotting apparatus;

c. allowing the molten material to pass through the orifices to form droplets; and

d. cooling the droplets thus formed to a temperature at which the droplets are solid.

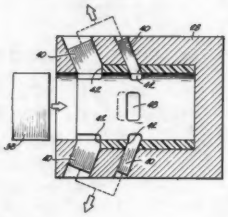
4,986,942

METHOD FOR FORMING PORTED CYLINDER SLEEVE LINER FOAM PATTERN

Christopher R. Irgens, Elm Grove, and Francis V. Bailey, Racine, both of Wis., assignors to Outboard Marine Corporation, Waukegan, Ill.

Filed Mar. 22, 1988, Ser. No. 171,574
Int. Cl.[5] B29C *39/26, 67/20*
U.S. Cl. 264—51 **3 Claims**

1. A process for forming a one-piece ported cylinder sleeve foam pattern, said process comprising the steps of moving opposed elements of a two-piece mold tool into registry with each other so as to form therebetween a generally cylindrical hollow cavity having an axis and conforming substantially to the exterior size and shape of a ported cylinder sleeve, inserting a center core into the hollow cavity so as to define between the center core and the mold tool elements a hollow space conforming substantially to the size and shape of the ported cylinder sleeve, moving, at a non-perpendicular angle relative to a plane having therein said axis, at least one movable core into the space between the center core and the mold tool elements so as to occupy a volume corresponding to the size, shape and location of a port to be formed in the cylinder sleeve, filling the space between the center core and the mold tool elements and



around the movable core with a molding material, moving the movable core from the space between the center core and the mold tool elements, and displacing the mold tool elements and the center core away from one another so as to permit removal of the molded ported cylinder sleeve.

4,986,943

METHOD FOR OXIDATION STABILIZATION OF PITCH-BASED MATRICES FOR CARBON-CARBON COMPOSITES

Patrick M. Sheaffer, Lawndale, and Jack L. White, Del Mar, both of Calif., assignors to The Aerospace Corporation, El Segundo, Calif.

Filed Feb. 28, 1989, Ser. No. 316,746
Int. Cl.[5] C01B *31/02*
U.S. Cl. 264—29.1 **6 Claims**

1. A process for the fabrication of carbon fiber reinforced carbon matrix composites to a desired shape comprising the steps of:

a. configuring a lattice-work of carbon fibers to the desired shape of a reinforced composite;

b. infiltrating the lattice-work with a pitch based matrix precursor;

c. oxidizing the infiltrated lattice-work to stabilize the matrix during subsequent carbonization; and,

d. carbonizing the infiltrated, oxidized lattice-work.

4,986,944

ANTI-COLLISION METHOD AND APPARATUS FOR AN INJECTION MOLD

Rene Bertschi, Toronto, Canada, assignor to Husky Injection Molding Systems Ltd., Bolten, Canada

Filed Oct. 31, 1988, Ser. No. 264,840
Int. Cl.[5] B29C *45/64, 45/80*
U.S. Cl. 264—40.5 **11 Claims**

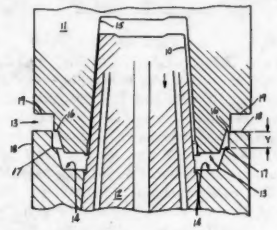
1. A method of preventing mold damage due to improper core and cavity alignment in an injection mold assembly for molding thin wall articles including a mold core and a concentric mold cavity moving relative to one another along a common axis in cyclic, reciprocatory fashion, said mold core and said mold cavity each having a primary surface for molding and a secondary surface for mold control wherein the clearance between the secondary surfaces is less than the thickness of the wall of an article molded by the assembly comprising the steps of:

providing on one said secondary surfaces a shoulder concentric with said axis,

providing on the other of said secondary surfaces a cooperating, concentric guide means,

said shoulder and said guide means being operable to contact one another during said reciprocatory motion when the primary surfaces are improperly aligned to the extent that

contact between said primary surfaces is imminent after initial entry of the mold core into the mold cavity, and



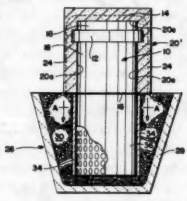
utilizing the occurrence of contact between said secondary surfaces to signal shut down of the molding cycle whereby damage to the mold primary surfaces is averted.

4,986,945

METHOD FOR PRODUCING MOLD-SHAPED CERAMIC BODIES

E. Allen LaRoche, Jr., Middletown, Del. 19709, assignor to Lanxide Technology Company, LP, Newark, Del.

Continuation of Ser. No. 207,028, Jun. 13, 1988, Pat. No. 4,834,925, which is a continuation of Ser. No. 1,129, Jan. 7, 1987, abandoned. This application Dec. 6, 1988, Ser. No. 280,662
The portion of the term of this patent subsequent to May 30, 2006, has been disclaimed.
Int. Cl.[5] C04B *35/60*
U.S. Cl. 264—60 **9 Claims**



1. A method for producing a shaped, self-supporting ceramic body, the method comprising:

(a) providing a shaped parent metal comprising a material selected from the group consisting of aluminum, silicon, titanium, tin, zirconium, and hafnium, said parent metal further comprising at least one dopant and having a pattern section;

(b) applying to said pattern section a conformable, gas-permeable material selected from the group consisting of plaster of paris, Portland Cement, calcium silicate, and mixtures thereof, at least a portion of which function as a barrier to growth of oxidation reaction product to provide a mold having a shaped surface which is substantially congruent to said pattern section, said material being, at least under the processing conditions defined in following steps (d) and (e), self-bonding, at least in a support zone thereof immediately adjacent to and coextensive with said surface, to provide said mold with sufficient cohesive strength to retain the integrity of said shaped surface under the processing conditions defined in following steps (d) and (e);

(c) orienting said parent metal and a receptacle to place said parent metal in flow communication with said receptacle, the capacity of said receptacle being at least sufficient to accommodate substantially all of said parent metal in molten form;

(d) heating said parent metal to a temperature region above its melting point but below the melting point of its oxidation reaction product and evacuating the resulting molten parent metal from said mold into said receptacle to provide a mold cavity;

(e) continuing said heating in the presence of a vapor-phase oxidant and, in said temperature region,

(i) reacting the molten parent metal with said oxidant to form an oxidation reaction product,

(ii) maintaining at least a portion of said oxidation reaction product in contact with and between said body of molten metal and said oxidant, to progressively draw molten metal from said body through the oxidation reaction product and into said mold for contact with said oxidant so that oxidation reaction product continues to form within said mold at the interface between the oxidant and previously formed oxidation reaction product, and

(iii) continuing said reaction to grow said oxidation reaction product into contact with said shaped surface, thereby forming a ceramic body whose shape is determined by the shape of said mold cavity, and

(f) recovering said ceramic body from said mold.

4,986,946

POLYIMIDE ARTICLES OF INTERMEDIATE ELECTRICAL CONDUCTIVITY AND A PROCESS FOR MAKING THEM

Darrell J. Parish, Circleville, Ohio, assignor to E. I. Du Pont de Nemours and Company, Wilmington, Del.

Division of Ser. No. 212,963, Jun. 29, 1988, abandoned. This application Mar. 13, 1989, Ser. No. 322,621
Int. Cl.[5] C04B *35/00*; H01B *1/00*
U.S. Cl. 264—104 **6 Claims**

1. A process for making a film having good high temperature performance and intermediate electrical conductivity comprising the steps of:

(a) dispersing about 10 to about 45% by weight, based on the weight of the final film, of a finely-divided electrically conductive particulate material homogeneously throughout a casting dope, said casting dope comprising a polyamic acid and a solvent for the polyamic acid, said solvent being present in an amount of about 75 to about 90 weight percent of the combined polyamic acid and particulate material;

(b) casting or extrudinq the dispersion formed in step (a) onto a smooth surface;

(c) providing intimate contact of the dispersion on the smooth surface with polyamic acid conversion chemicals in sufficient quantity and at a sufficient temperature to partially convert the polyamic acid to polyimide, thereby forming a gel;

(d) thereafter contacting the gel with an aqueous medium comprising a major proportion of water and a minor proportion of solvent for the polyamic acid; and

(e) maintaining the contact of step (d) for a sufficient time and with a sufficient volume of aqueous medium to reduce the amount of solvent in the gel to less than 15 parts of solvent per 100 parts of polyamic acid-polyimide.

4,986,947

METHOD FOR CONNECTING ENDS OF WEATHER STRIPS

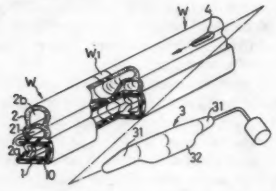
Kiyoshi Shigeki, Fukuroi, and Masahiro Nozaki, Ama, both of Japan, assignors to Toyoda Gosei Co., Ltd., Nishikasugai, Japan

Filed Apr. 19, 1990, Ser. No. 511,409
Claims priority, application Japan, Jun. 29, 1989, 1-167830
Int. Cl.[5] B29C *41/40, 41/20*
U.S. Cl. 264—250 **4 Claims**

1. A method for connecting ends of weather strips, each

being made of an elastic material, and having a base portion and a tubular sealing portion projecting from the base portion, the sealing portion having a rib for dividing an interior of the tubular sealing portion into a first chamber on the side of the base portion, and a second chamber on the side of a top end of the tubular sealing portion, comprising the steps of:

coupling the ends of the weather strips by a single core in opposing relationship, both ends of said single core being inserted into the second chambers of the ends of the weather strips, respectively, said core having such a cross-



sectional shape that each of said both ends of said single core fills the second chamber, and that said single core presses the rib against the base portion;

setting the ends of the weather strips, which are coupled by said single core, within a cavity of a mold;

pouring an elastic material into said cavity to mold a connecting portion between the ends of the weather strips; and

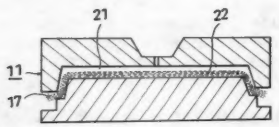
removing said single core from the second chambers of the weather strips after molding.

4,986,948

MOLDING PROCESS FOR FIBER REINFORCED PLASTICS

Kiyoshi Komiya, Mishima, and Yoshimasa Nakamura, Ikeda, both of Japan, assignors to Takeda Chemical Industries, Ltd., Osaka, Japan

Continuation of Ser. No. 134,080, Dec. 17, 1997, abandoned. This application Apr. 24, 1989, Ser. No. 342,598
Claims priority, application Japan, Dec. 19, 1986, 61-305002
Int. Cl.[5] B29C *45/14*
U.S. Cl. 264—257 **5 Claims**



1. A molding process for forming an article of fiber reinforced plastics which comprises: carrying out in sequence, the steps comprising:

placing fiber reinforcements on one half of a mold having two mold halves defining a mold cavity and which has positive pinch-off edges, the fiber reinforcements being deposited in amounts of about 50–80% by weight based on the resultant fiber reinforced plastics;

positioning the mold halves near to each other yet not completely closing the mold to grasp the fibers between the pinch-off edges so that resin does not escape from the mold through the fiber reinforcements while resin is injected into the mold cavity and distributed therein;

injecting a resin which has a viscosity of not more than about 1500 cps into the mold cavity of the mold halves thus positioned through a resin injection opening provided in the mold, thereby enabling ready and thorough impregnation of the fiber reinforcements; and

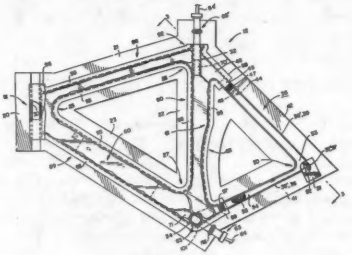
closing the mold and thereby applying molding pressure to form the article.

4,986,949

METHOD OF MAKING COMPOSITE BICYCLE FRAMES

Brent J. Trimble, P.O. Box 246, Berryville, Ark. 72616

Division of Ser. No. 207,631, Jun. 19, 1988, Pat. No. 4,889,355, which is a continuation-in-part of Ser. No. 123,338, Nov. 20, 1987, Pat. No. 4,902,458, which is a continuation-in-part of Ser. No. 53,370, May 12, 1987, Pat. No. 4,850,607, which is a continuation-in-part of Ser. No. 861,983, May 12, 1986, abandoned. This application Nov. 14, 1989, Ser. No. 435,907
The portion of the term of this patent subsequent to Feb. 20, 2007, has been disclaimed.
Int. Cl.[5] B29C *43/18, 43/10*
U.S. Cl. 264—258 **34 Claims**



1. A method of making a generally hollow cycle frame component for connecting at least two of a steering support means for supporting a fork assembly, a seat support means for supporting a seat assembly, a pedal support means for supporting a pedal assembly, and a wheel support means for supporting a wheel assembly, said method comprising:

forming at least two wall sections each comprising at least one layer of fibrous material impregnated with a synthetic resin, a part of one of said sections being arranged to be placed in opposing relation to a corresponding part of the other of said sections, and the resin of at least one of said parts being substantially uncured;

placing said wall sections adjacent to each other with said corresponding parts in opposing relation;

transversely overlapping said opposing parts and forming a generally hollow shell extending longitudinally between at least two of said support means, said shell having an interior cavity for receiving internal compression means;

placing said internal compression means in the interior cavity of said shell and said uncured part(s) of said shell adjacent to external compression means;

causing said internal and external compression means to press said overlapped parts together and shape said uncured part(s) of said shell; and,

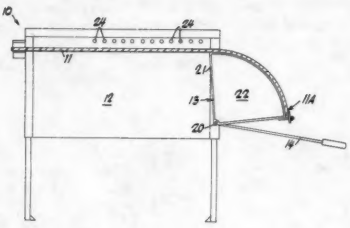
curing said uncured part(s) of said shell while under said compression to form a generally hollow unitary frame component extending longitudinally between and connecting said at least two support means, said compression and curing causing said overlapped parts to form at least one pressure molded juncture integrally uniting said adjacent wall sections together and providing a substantially continuous wall of said resin impregnated fibrous material around an interior cavity of said generally hollow unitary frame component, and said at least one pressure molded juncture comprising overlapping layers of resin-impregnated fibrous material provided by said overlapped parts of said adjacent wall sections.

4,986,950

METHOD OF FORMING POLYCARBONATE SHEETING

Graham Long, South Coogee, Australia, assignor to Precision Roofing Accessories Co. Pty., West Ryde, Australia

Filed Feb. 1, 1989, Ser. No. 305,276
Int. Cl.[5] B29C *53/04*; B29D *25/00*; B29K *69/00*
U.S. Cl. 264—310 8 Claims



1. A method of forming at least a portion of a twin walled sheet into a generally arcuate configuration, said method comprising:

heating said portion of the sheet in a heating chamber to a forming temperature prior to forming, and also heating a mould member mounted within the heating chamber to said forming temperature;

said mould member comprising an external shell having said arcuate configuration;

moving a leading edge of said portion from an initial position spaced from the mould member to be in contact with and secured to said mould member;

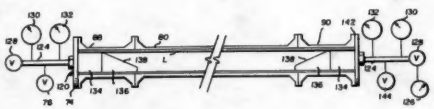
rotating said mould member to progressively move said sheet through said chamber and to form said portion of the sheet against the mould member and cooling said sheet as it is removed from the chamber.

4,986,951

PIPE LINER PROCESS

Patrick R. Ledoux, New Orleans, La., and Luc R. Fourgaut, Huegeville, France, assignors to Pipe Liners, Inc., Metairie, La.

Continuation-in-part of Ser. No. 114,949, Oct. 30, 1987, and a continuation-in-part of Ser. No. 77,883, Jul. 27, 1987, Pat. No. 4,863,365. This application Apr. 29, 1988, Ser. No. 188,468
Int. Cl.[5] B29C *63/38*, *53/08*
U.S. Cl. 264—516 5 Claims



1. A process for installing a thermoplastic liner in a pipe for flowing a service fluid under pressure through the pipe liner comprising the steps of:

providing a hollow generally cylindrical liner formed of thermoplastic material having a shape memory activation temperature;

reducing the cross-sectional shape of said liner at said shape memory activation temperature and cooling said reduced liner to a temperature substantially below said shape memory activation temperature, such that the liner retains a memory of its cylindrical shape, thereby to maintain the liner in said reduced shape and enable the reduced liner to be pulled into the pipe;

disposing the reduced liner into said pipe such that end portions of said liner extend beyond the opposite ends of the pipe;

partially expanding the liner end portions which extend beyond the opposite ends of the pipe by mechanical means inserted into said liner end portions such that said expanded liner end portions approximate the original cylindrical shape of the liner;

sealing the expanded liner end portions beyond the opposite ends of the pipe to seal the interior of said liner at its opposite ends;

mechanically reforming the reduced liner by passing a pig through the liner between the sealed ends thereof to expand the liner to cause the liner to return to its generally cylindrical cross-section and bear against the interior walls of the pipe;

the step of passing the pig including providing a differential pressure on opposite sides of the pig within the liner to propel the pig between the sealed ends of the liner;

subsequent to mechanically reforming the liner to its generally cylindrical cross-section and while maintaining said liner sealed, maintaining the interior of the liner from end to end under a pressure at least as great as the pressure behind the pig when passing the pig through the liner for a predetermined time to maintain the liner against the interior walls of the pipe and to substantially relieve the stresses in the liner otherwise tending to cause the liner to return to its reduced shape;

then depressurizing the liner and removing the mechanical means; and then

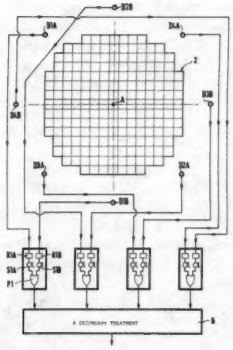
pressurizing the liner with the service fluid for a period of time sufficient to fully relieve the stresses in the liner so that the liner is maintained in its generally cylindrical remembered shape.

4,986,952

PROTECTION SYSTEM FOR PROTECTING A NUCLEAR REACTOR IN THE EVENT OF A REACTION-INHIBITING ELEMENT FALLING

Jean-Michel Bourin, Paris; Jean-Lucien Mourlevat, Noisy le Roi, and Gilbert Sengler, Elancourt, all of France, assignors to Framatome, Courbevoie, France

Filed Jan. 27, 1989, Ser. No. 302,279
Claims priority, application France, Jan. 27, 1988, 88 00926
Int. Cl.[5] G21C *7/36*
U.S. Cl. 376—215 4 Claims



1. A protection system for protecting a nuclear reactor in the event of a reaction-inhibiting element falling, said system being applicable to a reactor having a vertical axis core which is the site of a nuclear reaction, said reaction being accompanied by a neutron flux which is distributed, at least angularly, around said axis, said core having vertical hollows distributed at least

angularly around said axis and being provided with controllable reaction-inhibiting elements capable of descending in said hollows in order to absorb said neutron flux, thereby controlling said nuclear reaction, such that an accidental fall of one of said reaction-inhibiting elements into one of said hollows locally absorbs said neutron flux and disturbs the neutron flux distribution around said axis, and such that continuing said nuclear reaction may then damage said core, said system including not less than three separate protection chains, each of which comprises:

a neutron flux detector (D1) disposed at a distance from said axis (A) for measuring a neutron flux which, in the event of one of said reaction-inhibiting elements falling, is subjected to a reduction, with the reduction being larger the nearer said detector is to said hollow in which said fall has taken place; and

a primary treatment circuit (R1, S1) associated with said detector (D1) for providing a primary fall signal solely when the neutron flux measured by said detector is subjected to a reduction whose rate of decrease exceeds a predetermined speed threshold;

said detectors being angularly distributed around said axis;

said system further including a secondary treatment circuit (6) receiving the fall signals output by said protection chains and providing a secondary fall signal solely on receiving not less than two of said fall signals from two respective chains, thereby reducing the risk of such a secondary fall signal being provided when one of said reaction-inhibiting elements has not fallen; and

means for limiting said nuclear reaction in the event that said secondary fall signal is provided;

said system being characterized by the fact that each of said protection chains includes:

at least two of said neutron flux detectors (D1A, D1B) angularly separated by more than 90° about said axis (A);

two of said primary treatment circuits (R1A, S1A and RIB, S1B) associated respectively with said two detectors for providing said primary fall signals; and

an intermediate treatment circuit (P1) for receiving said primary fall signals and for providing an intermediate fall signal on receiving at least one primary fall signal from at least one of said two primary treatment circuits;

said fall signals provided at the outputs from said protection chains and received by said secondary treatment circuit (6) being constituted by said intermediate fall signals, such that said secondary fall signal is provided in the event of one said reaction-inhibiting elements falling even if the resulting reductions in neutron flux received by a plurality of said detectors which are relatively far away from said hollow receiving said falling reaction-inhibiting element do not exceed said predetermined variation speed threshold, and even in the event of one of said chains being faulty so that it prevents one of said primary fall signals from a detector relatively close to said hollow being generated.

4,986,953

DEVICE FOR THE SUPPORT AND POSITIONING OF MEANS FOR CHECKING AND TOOLS FOR WORKING ON FUEL ASSEMBLIES

Gebelin Bernard, Tassin la Demi-Lune, France, assignor to Framatome, Courbevoie and Cogema, Velizy Villacoublay, both of, France

Filed Dec. 28, 1989, Ser. No. 458,472

Claims priority, application France, Dec. 28, 1988, 88 17346

Int. Cl.[5] G21C *1706*

U.S. Cl. 376—245 **12 Claims**

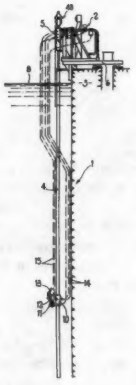
1. Device for the support and positioning of means for checking and tools for working on fuel assemblies of a water nuclear reactor which are immersed in a pool under a certain depth of water, characterized in that it comprises:

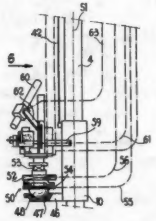
a control station (2) having a support (6) fixed on the edge (3) of the pool,

a rod (4) connected to the support of the control station at its upper end (5) and disposed in a substantially vertical position inside the pool so as to present a part located opposite at least one fuel assembly disposed inside the pool,

means (35, 36) for adjusting the inclination of the rod (4) relative to the vertical direction and for immobilizing the rod in at least one inclined position, which means are fixed on the support (6) of the control station (2),

a carriage (10) mounted so as to be movable along the length of the rod (4) interacting with guide means carried by the rod (4),





means (40, 41, 42, 43) for displacing the carriage (10) which are controlled from the control station (2),

at least one tool support (12) intended to receive at least one means for checking (13) and at least one work tool (59),

an assembly (50) for displacing the tool support (12) in two different directions perpendicular to the axis of the rod (4), carried by the carriage (10),

means (56, 57) for controlling the displacements of the tool support (50) which can be activated from the control station (2),

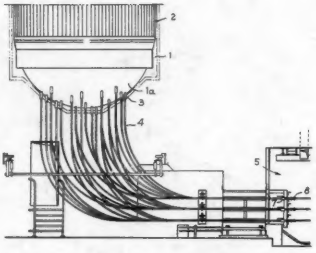
and means (61, 63) for controlling the means (60) for checking and the tool (59) from the control station (2).

4,986,954

DEVICE FOR MEASURING PARAMETERS IN THE CORE OF A NUCLEAR REACTOR IN OPERATION

René Feurgard, La Celle Saint Cloud, France, assignor to FRAMATOME, Courbevoie, France

Filed Jun. 6, 1989, Ser. No. 362,537
Claims priority, application France, Jun. 6, 1988, 88 07497
Int. Cl.[5] G21C *17/00, 19/22*
U.S. Cl. 376—254 9 Claims



1. In a nuclear reactor system including a reactor vessel, reactor coolant, an instrumentation room, and a measuring device, said device comprising a measuring conduit inside which there is placed, in a central position and in a coaxial manner, a closed and leakproof sheath (13) for guiding a movable probe for measuring neutron flux and, in peripheral positions, a plurality of probes (15) for measuring physical parameters of the core, the measurement conduit (10) being mounted movably in a guide tube (4) connecting the reactor vessel (1) to the instrumentation room (5) which the measurement conduit enters by passing in a sliding and leakproof manner through a sealing nozzle (25) integrally attached to the end of the guide tube (4), the improvement wherein the peripheral measuring probes (15) are fastened to the end of flexible measurement and movement cables (16), and said probes are mounted movably, each inside a leakproof peripheral sheath (14), a plurality of peripheral sheaths (14) being mounted inside the measurement conduit (10) around the central sheath (13) in a helical arrangement, the nozzle (25) comprising a helical arrangement, the nozzle (25) comprising a leakproof chamber (40) isolated from the primary coolant fluid and in the instrumentation room (5), into which there open the peripheral sheaths (14) of the conduit (10), each of which comprises, at its end, a leakproof passage (50, 50') for the sliding exit of the measurement cable (16) and of the corresponding probe (15) into the chamber (40), leakproof passage devices (52) for each of the cable-probe units (15, 16) also being placed on an exit wall (42) of the chamber (40) of the nozzle (25).

4,986,955

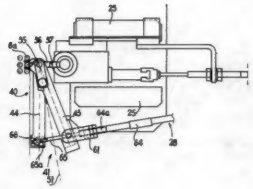
DEVICE FOR REMOVING PERIPHERAL FUEL RODS FROM A FUEL ASSEMBLY OF A NUCLEAR REACTOR

Louis Guironnet, Lyon, and Michel Bline, L'Arbresle, both of France, assignors to Framatome, Courbevoie and Cogema, Velizy Villacoublay, both of, France

Filed Dec. 28, 1989, Ser. No. 458,478
Claims priority, application France, Dec. 28, 1988, 8817345
Int. Cl.[5] G21C *19/26, 19/32*
U.S. Cl. 376—261 6 Claims

1. Device for removing peripheral fuel rods (6*a*) of a fuel assembly (1) of a nuclear reactor comprising a framework consisting of a plurality of spacer grids (2) holding the fuel rods (6) in a uniform network in transverse directions and in the axial directions of the fuel rods (6) by gripping means associated with cells of the grids (2) in which the rods (6) are inserted as well as of guide tubes (3) replacing certain rods (6) in the network and of end joining pieces (4, 5) fixed on ends of guide tubes (3), removal being performed remotely and under a certain depth of water in a storage pool for fuel assemblies after removing an end joining piece (4, 5) of the assembly by virtue of the device which comprises a rod (20) on which is mounted a means (22, 24, 25) for support and displacement of a work tool and which is movable in an axial direction of the rod (20) and in two directions perpendicular to this axial direction, wherein the work tool comprises:

(a) tongs (41) consisting of two arms (43, 44) articulated together about a shaft (35) fixed on the means (25) for support and displacement in a direction parallel to the axis of the rod (20) and comprising end jaws (57, 58) which are capable of gripping a fuel rod (6*a*) between them;



(b) means (64, 65) for remotely controlling the tongs (41), comprising an element (65) which is movable in translation and an element (64) for guiding the movable element, (65) each connected to an arm (43, 44) of the tongs (41) in the vicinity of the end of the corresponding arm opposite to the end jaws; and

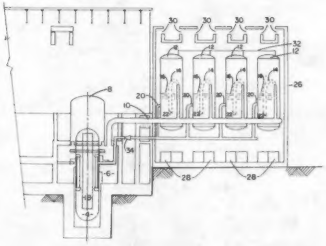
(c) at least one video camera (26) carried by the means (22, 24, 25) for support and displacement in order to supply an image of the zone in which the rods (6*a*) are gripped, removal being performed by displacing the means (22, 24, 25) for support and displacement in the vertical direction after positioning and gripping the jaws (57, 58) of the tongs on a part of the rod (6*a*).

4,986,956

PASSIVE NUCLEAR POWER PLANT CONTAINMENT SYSTEM

George Garabedian, Boston, Mass., assignor to Stone & Webster Engineering Corporation, Boston, Mass.

Filed Nov. 27, 1989, Ser. No. 441,459
Int. Cl.[5] G21C *9/00*
U.S. Cl. 376—283 11 Claims



1. A closed passive nuclear reactor pressure suppression containment system comprising a low leakage reactor compartment housing a reactor vessel and its associated primary coolant system, at least one vent line extending from the reactor compartment, a plurality of suppression tanks elevated above the reactor compartment and partially filled with water,

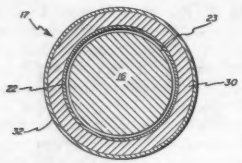
a downcomer line from said vent line directed into each suppression tank at a point above the water level in said tanks and terminating below the water level in said suppression tanks, and at least one return line from each suppression tank, located below the water level in said suppression tank, to return water to the reactor vessel through a check valve in said return line, wherein during a loss of coolant accident causing an increased pressure in the reactor compartment steam and gases are directed through said vent line and said downcomer lines, the gases being filtered and steam condensed by said water in said suppression tanks and noncondensable gases vented into the gaseous space in said suppression tanks, and the heat from said condensed steam is transferred from said suppression tanks to the surrounding environment.

4,986,957

CORROSION RESISTANT ZIRCONIUM ALLOYS CONTAINING COPPER, NICKEL AND IRON

Dale F. Taylor, Schenectedy, N.Y., assignor to General Electric Company, Schenectady, N.Y.

Filed May 25, 1989, Ser. No. 356,474
Int. Cl.[5] G21C *3/00*
U.S. Cl. 376—417 **10 Claims**



1. A corrosion resistant nuclear fuel element, comprising;
an elongated cladding container formed from a zirconium alloy tube consisting essentially of by weight percent 0.5 to 2.0 percent tin, 0.24 to 0.40 percent of a solute composed of copper, nickel and iron, and the balance zirconium; and
a central core of a body of nuclear fuel material selected from the group consisting of compounds of uranium, plutonium, thorium and mixtures thereof disposed in and partially filling the container so as to leave a gap between the container and the core and an internal cavity at one end of the container an enclosure integrally secured and sealed at each end of the container and a nuclear fuel material retaining means positioned in the cavity.

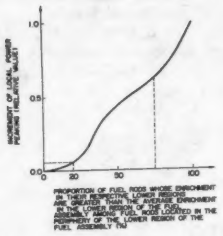
4,986,958

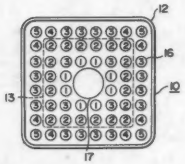
FUEL ASSEMBLY

Katsumasa Haikawa, Hitachi, Japan, assignor to Hitachi, Ltd., Tokyo, Japan

Filed Oct. 25, 1988, Ser. No. 261,996
Claims priority, application Japan, Nov. 2, 1987, 62-275775
Int. Cl.[5] G21C *3/00*
U.S. Cl. 376—419 **4 Claims**

1. A fuel assembly having a plurality of fuel rods and a water rod occupying an area for accommodating at least four fuel rods, wherein, in the upper region of said fuel assembly, the proportion of fuel rods among fuel rods located in an outermost peripheral section of said fuel assembly whose enrichment in their respective upper regions is greater than the average enrichment in the upper region of said fuel assembly is not less than 50 percent, and in the lower region of said fuel assembly, the proportion of fuel rods among fuel rods located in the outermost peripheral section of said fuel assembly whose enrichment in their respective lower regions is greater than the





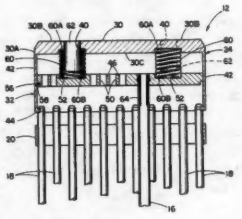
average enrichment in the lower region of said fuel assembly is not greater than 20 percent.

4,986,959

NUCLEAR FUEL ASSEMBLY WITH EXPANDABLE TOP NOZZLE SUBASSEMBLY

James A. Sparrow, and Yu C. Lee, both of Columbia, S.C., assignors to Westinghouse Electric Corp., Pittsburgh, Pa.

Filed May 17, 1989, Ser. No. 353,303
Int. Cl.[5] G21C *3/32*
U.S. Cl. 376—445 **22 Claims**



1. An expandable top nozzle subassembly for a nuclear fuel assembly, said top nozzle subassembly comprising:
(a) an upper structure including a top plate and a sidewall enclosure rigidly connected to and depending below an outer peripheral edge of said top plate;
(b) a lower adapter plate disposed below said top plate of said upper structure and within said sidewall enclosure thereof, said adapter plate and sidewall enclosure being slidably movable relative to one another so as to vertically move said sidewall enclosure past an outer peripheral edge of said adapter plate as said top plate moves toward and away from said adapter plate;
(c) interengagable means on a lower edge of said sidewall enclosure and on said outer peripheral edge of said adapter plate for capturing and retaining said adapter plate within said sidewall enclosure upon movement of said

sidewall enclosure relative to said adapter plate and therewith said top plate which is attached to said sidewall enclosure away from said adapter plate; and

(d) a plurality of resiliently-yieldable biasing devices disposed in said sidewall enclosure and extending between and engaging said top plate and said adapter plate, said devices being movably displaceable between compressed and expanded states in response respectively to application and removal of a hold-down force on said upper structure in the direction of said adapter plate for permitting and causing movement of said sidewall enclosure relative to and past said outer peripheral edge of said adapter plate so as to move said top plate toward and away from said adapter plate and thereby said top nozzle subassembly between compressed and expanded conditions, only said biasing devices extending between and engaging both said top plate and said adapter plate such that the amount of reduction in the height of said top nozzle subassembly in moving from its expanded to compressed condition is only limited by the amount of displacement said biasing devices can undergo in moving from their expanded to compressed states.

4,986,960

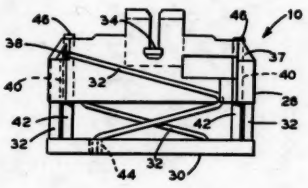
TWO PIECE END FITTING WITH HAIRPIN SPRINGS

Jeffrey G. Larson, Rustburg, Va., assignor to The Babcock & Wilcox Company, New Orleans, La.

Filed Jan. 30, 1989, Ser. No. 302,872

Int. Cl.[5] G21C *3/32*

U.S. Cl. 376—446 **9 Claims**



1. An upper end fitting for a nuclear fuel assembly, comprising:

a. a main body portion;

b. a lower plate slidably attached to said main body portion; and

c. a substantially hairpin shaped spring positioned between said main body portion and said lower plate whereby said main body portion is resiliently biased away from said lower plate.

4,986,961

FINE GRAIN TUNGSTEN HEAVY ALLOYS CONTAINING ADDITIVES

James R. Spencer, Sayre, and James A. Mullendore, Towanda, both of Pa., assignors to GTE Products Corporation, Stamford, Conn.

Continuation of Ser. No. 140,373, Jan. 4, 1988, Pat. No. 4,885,031. This application Oct. 2, 1989, Ser. No. 415,687

Int. Cl.[5] B22F *1/00*

U.S. Cl. 419—36 **3 Claims**

1. A process for producing consolidated bodies of tungsten heavy metal having the lower grain sizes comprising

(a) forming a relatively uniform blend of elemental metal powders, wherein the blend consists essentially of from about 88% to about 98% by weight of tungsten, from about 0.25% to about 1.5% by weight of a grain size reducing additive selected from the group consisting of ruthenium, rhenium and mixtures thereof, balance iron and nickel in a weight ratio of nickel to iron of from about 1:1 to about 9:1,

(b) pressing the powder to form a green body,

(c) sintering the green body in a reducing atmosphere for a time sufficient to achieve near theoretical density and

(d) liquid phase sintering for a time sufficient to achieve near theoretical density.

4,986,962

INHIBITORS OF CORROSION IN HIGH-STRENGTH AND MEDIUM-STRENGTH STEELS

Marco Cesari; Arnaldo Roggero; Luigi Rivola, all of San Donato Milanese, and Yean Demertzis, Milan, all of Italy, assignors to Enitricerche, S.p.A., Milan, Italy

Filed Jul. 17, 1989, Ser. No. 380,981

Claims priority, application Italy, Jul. 29, 1988, 21552 A/88; Dec. 23, 1988, 23094 A/88

Int. Cl.[5] C23F *11/00*

U.S. Cl. 422—7 **4 Claims**

1. Method for inhibiting the general corrosion and the stress embrittlement caused by hydrogen sulfide (SSC), both in the presence and absence of CO_2, of manganese and low-alloy steels having different values of mechanical strength, which are used in systems for drilling, producing, transporting and processing gas and petroleum, employing an aqueous-organic mixture comprising selecting compounds from the group consisting of the formula:

$$R_1—CH=N—[—(CH_2)_n—N=CH—]_m—R_2 \qquad (I)$$

wherein:

R_1 and R_2, may be equal to, or different from each other and are straight, saturated, non-substituted hydrocarbon chains of from 1 to 30 carbon atoms, or a two-ring aromatic radical;

m is either 0 or 1; and

n is a numeral comprising the range of from 1 to 30,

and adding said compound to the aqueous-organic mixture into contact with said system.

4,986,963

METHOD OF DISINFECTING CONTACT LENSES WITH PERACETIC ACID

Richard A. Corcoran, 2801 Casa de Vida Dr., Aptos, Calif. 95003, and James P. Whinston, 760 SW. Vista Ave., Apt. 33, Portland, Oreg. 97205

Filed Jan. 24, 1989, Ser. No. 301,810

Int. Cl.[5] A61K *31/185; A61L 2/18*

U.S. Cl. 422—30 **5 Claims**

1. A method for disinfecting a contact lens comprising:

contacting said lens with a sterilizing composition comprising about 0.0001% to 10.0% by weight peracetic acid for a time period sufficient to disinfect said lens; and

antiseptically removing said peracetic acid from said lens after said disinfecting thereof, said removing comprising contacting said lens with a peracetic acid removing agent to leave said lens and the remaining composition sterile and biocompatible to the human eye and isotonic to human tears.

4,986,964

CLOT RETRACTOMETER

Marcus E. Carr, Jr., and Sheryl L. Zekert, both of Richmond, Va., assignors to Center for Innovative Technology, Herndon and Virginia Commonwealth University, Richmond, both of, Va.

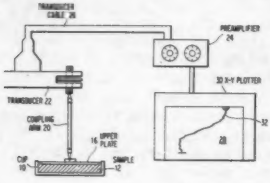
Filed Apr. 19, 1990, Ser. No. 511,040

Int. Cl.[5] G01N *33/48*

U.S. Cl. 422—73 **15 Claims**

1. An instrument for measuring the retraction force characteristics of a blood clot, comprising:

a means for holding a blood sample between a pair of parallel plates position a fixed distance apart, said means for holding said blood sample comprising a side wall attached to one of said plates which forms an open top cup with said plate, another of said plates fitting within said open top cup and having an outer periphery spaced from said side



wall, each of said plates capable of being in contact with said blood sample such that platelets in said blood sample can adhere to each of said plates; and

a means for sensing a pulling force exerted on one of said plates pulling said plates towards each other as said blood sample forms a blood clot, said means for sensing producing an electric signal proportional to said pulling force.

4,986,965

LIQUID CONTAINER FOR USE IN BIOCHEMICAL ANALYSIS

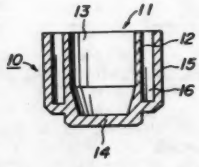
Masao Ushikubo, Hachioji, Japan, assignor to Olympus Optical Co., Ltd., Tokyo, Japan

Continuation of Ser. No. 665,944, Oct. 29, 1984, abandoned. This application Aug. 15, 1986, Ser. No. 896,312

Claims priority, application Japan, Nov. 1, 1983, 58-168338

Int. Cl.[5] B65D *23/06*

U.S. Cl. 422—102 **1 Claim**



1. A container for containing a liquid for use in a biochemical analysis, comprising:

a primary liquid holding portion including an inner side wall and a bottom wall connected to a lower end of the inner side wall; and

an overflow liquid holding portion including an outer side wall which is integrally formed with said primary liquid holding portion, both said inner side wall and said outer side wall having a circular lateral cross section, said inner side wall and said outer side wall being arranged concentrically relative to each other such that said outer side wall surrounds and is spaced from the inner side wall to form a ring-shaped recess therebetween for receiving and holding an overflow liquid, said overflow liquid holding portion further including a bottom wall which is connected between a lower end of the outer side wall and a lower end of the primary liquid holding portion, and upper edge of said inner side wall being disposed at a same level as an upper edge of said outer side wall, said bottom wall of said primary liquid holding portion being disposed lower than said bottom wall of said overflow liquid holding portion relative to said upper edges of said inner and outer side walls, said primary liquid holding portion and said overflow liquid holding portion being formed by a molding of plastic material.

4,986,966

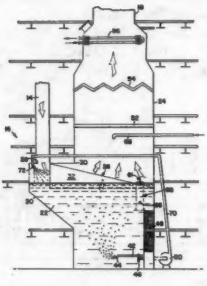
RETROFIT FLUE GAS SCRUBBER SYSTEM

John M. Lehto, Cokato, Minn., assignor to Northern States Power Company, Minneapolis, Minn.

Continuation-in-part of Ser. No. 61,217, Jun. 12, 1987, Pat. No. 4,853,195, which is a continuation of Ser. No. 872,118, Jun. 9, 1986, Pat. No. 4,762,686. This application Aug. 1, 1989, Ser. No. 388,615

Int. Cl.[5] B01D *47/02, 50/00, 53/34*

U.S. Cl. 422—168 **10 Claims**



1. A scrubber system for removal of fly ash and sulfur dioxide from flue gas, comprising:

means for removing fly ash particulate from flue gas, said fly ash removal means including a flue gas inlet and a flue gas outlet;

a tank having upper and lower ends, the lower end of said tank being filled with aqueous absorbent;

means defining a flue gas inlet in the upper end of said tank;

the flue gas inlet of said tank being connected to the flue gas outlet of said fly ash removal means;

means defining a flue gas outlet in the upper end of said tank in spaced relationship with the flue gas inlet therein;

partition means for dividing the upper end of said tank into two subchambers in respective fluid communication with the flue gas inlet and the flue gas outlet therein;

said partition means including a plurality of horizontal fingers each bounded in part by interconnected spaced-apart side walls with end walls connected between adjacent fingers in order to define a zigzag lower edge submerged in said aqueous absorbent, one side of said partition means opening onto the subchamber communicating with the flue gas inlet therein for directing the flue gas through the aqueuous absorbent, and the other side of said partition means opening into the subchamber communicating with the flue gas outlet therein; and

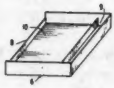
means extending into said tank beneath said partition means for introducing an oxygen containing gas into said aqueous absorbent.

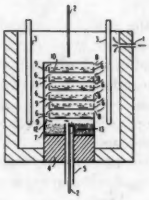
4,986,967

FURNACE STRUCTURE FOR CERAMIC POWDER PRODUCTION

Kazuhiko Nakano; Norio Matsuda, both of Osaka; Mitsutoshi Murase, and Hideaki Murakami, both of Ehime, all of Japan, assignors to Sumitomo Chemical Company, Limited, Osaka, Japan

Filed Mar. 3, 1988, Ser. No. 163,665
Claims priority, application Japan, Mar. 3, 1987, 62-49591
Int. Cl.[5] F27D 3/04, 5/00
U.S. Cl. 422—188 3 Claims





1. In a furnace structure for ceramic powder production including:

a stack of trays within the furnace, each tray having laterally opposed side walls, longitudinally opposed end walls and a bottom wall extending between said side walls and between said end walls, said bottom wall for supporting said ceramic powder or granules thereon, and

means for supplying fresh reactive gas to the furnace and for removing reactive byproduct gas therefrom,

the improvement comprising:

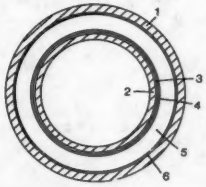
cutouts at the top of said side walls at one side of said trays to permit reactive gas to flow in parallel through said cutouts and over said ceramic powder or granules in respective trays, said side walls at the opposite side of said trays closing off said trays on said opposite side, said bottom walls each having an opening therein extending along the side wall at said opposite side, a retaining wall in each of said trays projecting vertically from the bottom wall and extending along said bottom wall opening from one end wall to the other and being of a vertical height less than the height of the side wall closing off each of said trays on said opposite side, said bottom wall openings aligning in said stack to define a continuous reactive gas passage, and a base plate underlying said stack of trays supporting said trays and having an opening therein communicating with said continuous reactive gas passage defined by bottom wall openings of said trays through which said reactive gas flows, said bottom wall openings being in vertical alignment and said cutouts being within said side walls on the same side of the stack of trays for receiving said reactive gas, whereby each of said trays is constantly supplied with a given amount of fresh reactive gas and reactive byproduct gas is smoothly removed from each tray via said continuous reactive gas passage, thereby promoting efficient and uniform reaction.

4,986,968

OZONE GENERATOR

Michael Hirth, Mellingen, and Günter Mechtersheimer, Nussbaumen, both of Switzerland, assignors to Asea Brown Boveri Limited, Baden, Switzerland

Filed Mar. 1, 1990, Ser. No. 486,850
Claims priority, application Switzerland, Mar. 3, 1989, 798/89-7
Int. Cl.[5] B01J 19/08
U.S. Cl. 422—186.19 8 Claims



1. An ozone generator with a first (1) and a second metallic electrode (2), with a layer (3, 4) of enamel on the surface of the second electrode (2) facing the first electrode (1) and a discharge gap (5) between the first electrode (1) and the enamel layer (3, 4), wherein the enamel layer consists of a plurality of layers (3, 4) of different dielectric constants lying one on top of the other, the first layer (4), adjacent to the discharge gap (5), having a smaller dielectric constant than the second enamel layer(s) (3) lying underneath.

4,986,969

METHOD FOR RECOVERING GALLIUM VALUE FROM AQUEOUS SOLUTION OF CRUDE ALUMINUM SALT

Koichi Tanihara, Ogoori, Japan, assignor to Japan as represented by Director General of Agency of Industrial Science and Technology, Tokyo, Japan

Filed Aug. 17, 1989, Ser. No. 394,940
Claims priority, application Japan, Sep. 2, 1988, 63-220850
Int. Cl.[5] C22B 58/00
U.S. Cl. 423—115 2 Claims

1. A method for the recovery of a gallium value from an aqueous solution produced by the Bayer process containing an aluminum salt as a principal solute and gallium ions which consists of:

(a) admixing the aqueous solution with a ferrocyanide compound soluble in water to selectively precipitate the gallium value in the form of gallium ferrocyanide, the amount of the ferrocyanide compound being in the range from 1.0 to 2.5 times the moles of the gallium ions contained in the aqueous solution when the concentration of gallium in the aqueous solution is larger than 50 mg/liter and at least equimolar to the gallium is contained in the solution but not exceeding such an amount to give a concentration of about 1.8×10^{-3} mole/liter thereof in the solution when the concentration of gallium in the aqueous solution does not exceed 50 mg/liter; and

(b) separating the precipitate of the gallium ferrocyanide from the solution.

4,986,970

METHOD FOR REMOVAL OF HEAVY METALS, ESPECIALLY CADMIUM, FROM PHOSPHORIC ACID CONTAINING SOLUTIONS

Hans F. T. Haraldsen, Porsgrunn, Norway, assignor to Norsk Hydro a.s., Oslo, Norway

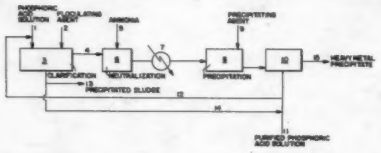
PCT No. PCT/NO89/00016, § 371 Date Nov. 3, 1989, § 102(e) Date Nov. 3, 1989, PCT Pub. No. WO89/08075, PCT Pub. Date Sep. 8, 1989

PCT Filed Feb. 24, 1989, Ser. No. 435,363

Claims priority, application Norway, Mar. 4, 1988, 880990

Int. Cl.[5] C01B *25/234*

U.S. Cl. 423—321 R 6 Claims



1. A method for removing heavy metals from a phosphoric acid-containing solution, which comprises neutralizing the solution to pH 1.4–2.0, cooling the solution to 5°–40° C. adding a metal salt of a dithio carbonic acid-O-ester to the solution to precipitate the heavy metals, and separating the precipitate from the solution.

4,986,971

METHOD FOR PRODUCTION OF TRICHLOROMONOSILANE

Karl Forwald, Kristiansand; Gunnar Schüssler, Drammen, and Oyvind Sorli, Sewickley, all of Norway, assignors to Elkem a/s, Norway

Filed Nov. 9, 1989, Ser. No. 434,087

Claims priority, application Norway, Dec. 8, 1988, 885454

Int. Cl.[5] C01B *33/08, 33/02;* B29B *9/00*

U.S. Cl. 423—342 6 Claims

1. A method for producing trichloromonosilane in a fluidized bed reactor by reaction wherein a silicon powder and gaseous hydrochloric acid are reacted at a temperature between 280° and 300° C., the improvement comprising using a silicon powder produced by gas atomization of molten silicon, whereby the amount of non-reacted hydrochloric acid and silicon tetrachloride produced during the reaction is reduced.

4,986,972

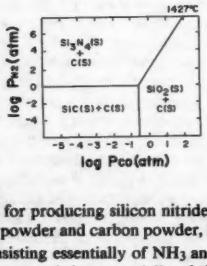
METHOD FOR MAKING SILICON NITRIDE POWDER

Toshitsugu Ishii; Isao Imai; Akira Sano, and Kouichi Sueyoshi, all of Kariya, Japan, assignors to Toshiba Ceramics Co., Ltd., Japan

Filed Mar. 17, 1988, Ser. No. 169,426

Int. Cl.[5] C01B *21/063, 33/06*

U.S. Cl. 423—344 15 Claims



1. A method for producing silicon nitride comprising:

mixing silica powder and carbon powder, in a gaseous atmosphere consisting essentially of NH_3 and CmHn, to form an admixture consisting essentially of silica and carbon;

feeding a mixed gas consisting essentially of NH_3 and CmHn into said gaseous atmosphere;

heating said admixture in said gaseous atmosphere so that said NH_3 and CmHn react with said silica and said carbon to form said silicon nitride and to produce H_2O as an intermediate reaction product, said CmHn reacting with said H_2O according to the following equation:

$$mH_2O+CmHn \rightarrow mCO+(m+n/2)H_2$$

whereby H_2O produced during the reaction is removed from the said gaseous atmosphere.

4,986,973

PROCESS FOR THE PRODUCTION OF CHLORINE DIOXIDE

Björn H. Svedin; Birgitta Sundblad, both of Sundsvall, and Jörgen Engström, Timra, all of Sweden, assignors to Eka Nobel AB, Surte, Sweden

Filed Oct. 26, 1989, Ser. No. 426,714

Claims priority, application Sweden, Apr. 18, 1989, 8901392

Int. Cl.[5] C01B *11/02*

U.S. Cl. 423—479 6 Claims

1. A process for the production of chlorine dioxide by reacting in a reaction vessel an alkali metal chlorate, mineral acid and a reducing agent in such proportions that chlorine dioxide is produced in a reaction medium which is maintained at a temperature of from about 50° C. to about 100° C. and at an acidity within a range of from about 2 to about 11 N and which is subjected to subatmospheric pressure sufficient for evaporating water, a mixture of chlorine dioxide and water vapour being withdrawn from an evaporation zone in the reaction vessel, and alkali metal sulfate being precipitated in a crystallization zone in the reaction vessel, characterized in that a mixture of formaldehyde and methanol is used as reducing agent.

4,986,974

PROCESS FOR THE SEPARATION OF HALOGENATED HYDROCARBONS FROM HYDROCHLORIC ACID

Wilhelm Lendle, Bad Soden am Taunus; Wolfgang Scheibitz; Heribert Tetzlaff, both of Frankfurt am Main, and Bernhard Wojtech, Bad Soden am Taunus, all of Fed. Rep. of Germany, assignors to Hoechst Aktiengesellschaft, Frankfurt am Main, Fed. Rep. of Germany

Filed Aug. 29, 1989, Ser. No. 400,272

Claims priority, application Fed. Rep. of Germany, Aug. 31, 1988, 3829449

Int. Cl.[5] C01B *7/07*

U.S. Cl. 423—488 13 Claims

1. A process for the extraction of a halogenated hydrocarbon from concentrated hydrochloric acid containing 10% to 37%, by weight of hydrogen chloride, by a continuously operated counterflow or cross-flow extraction in two or more stages with a straight-chain paraffin or a paraffin wax as extracting agent wherein the resulting hydrochloric acid has an impurities concentration of less than 3.9 ppm.

4,986,975

PROCESS FOR PURIFYING HYDROGEN CHLORIDE FROM PYROLYSIS OF 1,2-DICHLOROETHANE

Ludwig Schmidhammer, Haiming; Peter Hirschmann; Klaus-Peter Mohr, both of Burghausen; Hermann Klaus, Marktl, and Franz Haunberger, Burghausen, all of Fed. Rep. of Germany, assignors to Wacker-Chemie GmbH, Munich, Fed. Rep. of Germany

Filed May 5, 1989, Ser. No. 348,283

Claims priority, application Fed. Rep. of Germany, May 26, 1988, 3817938

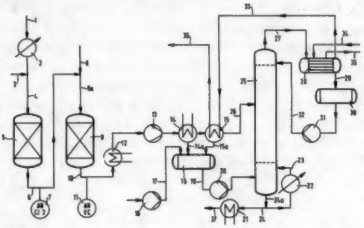
Int. Cl.[5] B01D *53/36;* C01B *7/07*

U.S. Cl. 423—488 4 Claims

1. A process for purifying a hydrogen chloride mixture containing acetylene and ethylene which comprises:

(a) reacting the hydrogen chloride mixture at a temperature of from about 120° C. to about 220° C., at a pressure of from about 5 to about 20 bar absolute in contact with a catalyst comprising activated carbon impregnated with at least one transition metal chloride in the presence of an amount of chlorine to provide a first hydrogen chloride reaction mixture containing from about 100 ppm to about 2000 ppm by volume of free chlorine;

(b) reacting the first hydrogen chloride reaction mixture containing from about 100 to about 2000 ppm by volume of free chlorine, at a temperature of from about 80° C. to about 180° C. with at least one member selected from the group consisting of olefins and chloroolefins, said olefins and chloroolefins being gaseous under atmospheric pres-



sure and which boil under atmospheric pressure in a temperature range of from about −50° C. to about 10° C., in contact with activated carbon impregnated with at least one transition metal chloride to form a second reaction mixture wherein the olefin and/or chloroolefin are present in the second reaction mixture after the reaction in an amount of from about 100 to about 1500 ppm by volume;

(c) rectifying the second reaction mixture in a column under a pressure of from about 7 to about 15 bar, hydrogen chloride from the top of the column being partially condensed and the partial condensate returned as reflux to the column, the temperature at the bottom of the column being maintained at about 50° C. to about 80° C., and

(d) recovering the purified hydrogen chloride.

4,986,976

RECOVERY OF GLYCINE AND GLAUBER'S SALT FROM WASTE CRYSTAL LIQUORS

Jon C. Thunberg, Milford, N.H., assignor to W. R. Grace & Co.-Conn., New York, N.Y.

Filed Apr. 11, 1989, Ser. No. 336,366

Int. Cl.[5] C01D *5/00, 15/06;* **C07C** *229/00*

U.S. Cl. 423—551 **12 Claims**

1. In a process for recovering glycine from a starting aqueous solution consisting essentially of sodium sulfate, glycine, and water, wherein said process comprises:

a. forming a first slurry having a temperature effective for preventing precipitation of glycine, the first slurry being a mixture of precipitated sodium sulfate and a first mother liquor, the first mother liquor being a second aqueous solution consisting essentially of sodium sulfate, glycine, and water, by evaporating water from the starting aqueous solution while maintaining its temperature within a range effective for preventing the precipitation of glycine;

b. separating the first mother liquor from the precipitated sodium sulfate;

c. cooling the separated first mother liquor to a temperature within a range effective for precipitating glycine to form a second slurry, the second slurry being a mixture of precipitated glycine and a second mother liquor, the second mother liquor being a third aqueous solution consisting essentially of sodium sulfate, glycine, and water; and

d. separating and recovering the precipitated glycine, the improvement comprising:

e. cooling said second mother liquor to a temperature within a range effective for precipitating a mixture of glycine and sodium sulfate decahydrate to form a third slurry, the third slurry comprising a mixture of precipitated glycine and sodium sulfate decahydrate and a third mother liquor; and

f. separating the precipitated glycine and sodium sulfate decahydrate from the third mother liquor.

4,986,977

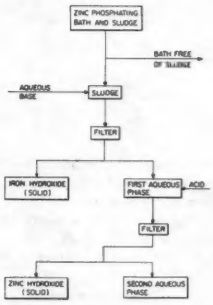
RECOVERY OF USEFUL PRODUCTS FROM BY-PRODUCTS OF PHOSPHATE CONVERSION COATING PROCESS

Donald S. Peters, Novelty, Ohio, assignor to Man-Gill Chemical Company, Cleveland, Ohio

Filed Dec. 12, 1989, Ser. No. 449,589

Int. Cl.[5] C23C *22/08*

U.S. Cl. 423—592 **22 Claims**



1. A process for recovering solid by-products contained in an aqueous metal phosphating solution used to phosphate coat a zinc or ferrous surface, and converting said by-products to useful materials which comprises the steps of:

(A) recovering the solid by-products from the used phosphating solution;

(B) treating the solid by-products with an aqueous base to a pH of about 10 to form a first aqueous phase and a metal-containing precipitate;

(C) recovering the metal-containing precipitate from the first aqueous phase;

(D) acidifying the first aqueous phase obtained in (C) to a pH of from about 7 to about 10 to form a second aqueous phase and an insoluble metal-containing precipitate;

(E) recovering the solid metal-containing precipitate from the second aqueous phase; and

(F) recovering the second aqueous phase.

4,986,978

PROCESS FOR REFORMING IMPURE METHANOL

René Dupont, Douai, and Guy Simonet, Paris, both of France, assignors to Societe Anonyme pour L'Etude et L'Exploitation des Procedes Georges Claude, Paris, France

Filed Oct. 28, 1988, Ser. No. 265,299

Claims priority, application France, Oct. 29, 1987, 87 15006

Int. Cl.[5] C01B *3/02*

U.S. Cl. 423—648.1 **2 Claims**

1. A process for reforming impure methanol to produce pure hydrogen, wherein aid methanol contains alcohols higher than methanol, comprising:

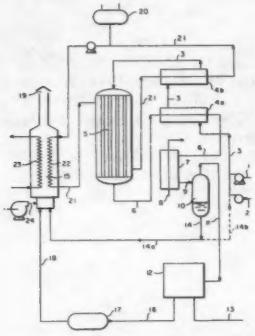
heating and vaporizing a mixture of feed water and impure methanol;

reforming said vaporized mixture of water and impure methanol at a temperature of about 300° C., whereby a reformed gas is produced;

cooling said reformed gas to produce a gas of impure hydrogen, a condensed methanol and higher alcohols - water mixture;

purifying said gas of impure hydrogen so as to produce pure hydrogen and a residual gas;

recycling a part of said condensed methanol and higher alcohols - water mixture with the feed liquid water and impure methanol; and



performing a simultaneous combustion of said residual gas and remaining non-cycled parts of said condensed methanol and higher alcohols-water mixture;

said vaporizing of said mixture of water and impure methanol being effected with heat exchange by recovering a part of said combustion heat after use of same as reforming heat.

4,986,979

IMAGING TISSUE SITES OF INFLAMMATION

A. Charles Morgan, Jr., Edmonds, and David C. Anderson, Seattle, both of Wash., assignors to NeoRx Corporation

Continuation-in-part of Ser. No. 324,285, Mar. 14, 1989. This application Jun. 9, 1989, Ser. No. 364,687

Int. Cl.[5] A61K *49/02, 37/00*

U.S. Cl. 424—1.1 7 Claims

1. A method of imaging a tissue site of inflammation comprising:

(1) withdrawing leukocytes from a patient;

(2) constructing a chemotactic peptide or a fragment, a derivative or analog thereof containing an affinity label and a radionuclide label;

(3) incubating leukocytes of step (1) with the peptide of step (2) for a time sufficient to permit binding thereof;

(4) photoactivating said affinity label;

(5) infusing into the patient an effective amount of the labeled peptide and leukocytes resulting from step (4); and

(6) imaging said tissue site,

whereby medical conditions involving tissue inflammation may be detected, evaluated and monitored.

4,986,980

WATER-SOLUBLE, CARRIER-BOUND PARAMAGNETIC METAL CONTAINING DIAGNOSTIC AGENTS

Trond Jacobsen, Oslo, Norway, assignor to Nycomed AS, Norway

Filed Nov. 1, 1985, Ser. No. 793,898

Claims priority, application Sweden, Nov. 1, 1984, 8405499

Int. Cl.[5] A61K *49/00*

U.S. Cl. 424—9 31 Claims

1. A diagnostic agent comprising a water-soluble macromolecular complex of a non-radioactive paramagnetic metal ion, wherein said agent comprises a physiologically tolerable, water-soluble, hydroxyl group-containing macromolecular product of weight average molecular weight ($\overline{M}_w$) of at least 30,000 to which is bound in a coordination complex at least one said non-radioactive paramagnetic metal ion, said macromolecular product comprising at least one material selected from the group consisting of polysaccharides, polymerized sugar alcohols and derivatives thereof.

4,986,981

TOOTHPASTE HAVING LOW ABRASION

William R. Glace, Orcutt, and Robert L. Ibsen, Santa Maria, both of Calif., assignors to Den Mat Corporation, Santa Maria, Calif.

Continuation-in-part of Ser. No. 268,583, Jul. 7, 1986, abandoned, which is a continuation of Ser. No. 882,185, Jul. 7, 1986, abandoned. This application Jul. 12, 1989, Ser. No. 379,010

Int. Cl.[5] A61K *7/16, 7/28*

U.S. Cl. 424—50 9 Claims

1. A toothpaste containing as active ingredients alkali metal citrate in an amount of about 1 to about 3.3% by weight of the toothpaste, citric acid in amounts up to about 3% by weight of the completed toothpaste, to provide a substantially neutral pH for the completed toothpaste, papain in an amount of about 1 to about 4.5% at activity level of 100–145 units/mg, as determined by Milk Clot assay test of the Biddle-Sawyer Group, and fine particle sized aluminum oxide with a particle size of about 1 micron in an amount of about 4 to about 12% by weight of the completed toothpaste.

4,986,982

COSMETIC COMPOSITION

Ian R. Scott, 6 Holylake, Wellingborough, Northants NN8 3NZ, England

Filed May 15, 1989, Ser. No. 351,747

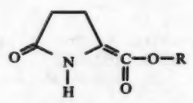
Claims priority, application United Kingdom, May 13, 1988, 8811408

Int. Cl.[5] A61K *7/48*

U.S. Cl. 424—63 10 Claims

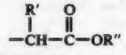
1. An aqueous composition for topical application to human skin which comprises:

(i) from 0.01 to 99% by weight of an ester of pyroglutamic acid having the structure:



(1)

where R is a linear or branched chain saturated or unsaturated alkyl group having from 1 to 12 atoms,



or the group:

where R′ and R″ are the same different and are each represented by H or the group:

$$](CH_3)_u(CH_2OH)_v(CH_2)_z(CHCH_3)_x(CHOH-)_y(CH{=}CH)_z] \quad (2)$$

where]u is zero, or 1 v is zero, or 1]

either u or v is 1 and the other of them is zero

w is zero, or an integer of from 1 to 21

x is zero, or an integer of from 1 to 4

y is zero, or an integer of from 1 to 2

z is zero, or an integer of from 1 to 4; and

u+v+w+x+y+z is an integer of from 1 to 22; the subgroups within the group (2) being in any sequence; provided that when the subgroup (CH=CH) is present, then the total number of carbon atoms in said group (2) will be from 10 to 20; and

(ii) from 1 to 99.9% by weight of a cosmetically acceptable

aqueous buffer having an effective pH of from 2 to <7; and

(iii) from 0 to 98.99% by weight of cosmetic adjuncts.

4,986,983

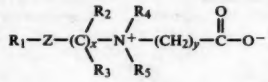
SUPERFATTED BETAINE AND ZWITTERIONIC HAIR AND SKIN CONDITIONER COMPOSITIONS

Terry Gerstein, East Brunswick, N.J., assignor to Revlon, Inc., New York, N.Y.

Filed Apr. 3, 1989, Ser. No. 332,698
Int. Cl.[5] A61K *1/06*
U.S. Cl. 424—070 7 Claims

1. A composition, for conditioning the hair or skin, consisting essentially of

(a) between about 1.5 and 15 weight percent of an N-alkyl-carobxylate-N-fatty alkyl-quaternary amine or -ammonium compound of the formula



wherein:

R_1 is fatty alkyl;

x is from 1 to about 3;

y is from 1 to about 6;

R_2, R_3, R_4 and R_5 are hydrogen, alkyl or hydroxyalkyl;

R_4, R_5, R_6 and R_7 may also form a nitrogen-containing ring together with the carbon and nitrogen atoms to which they are attached; and

Z represents an amido radical group or a carbon-carbon single bond; and

(b) between about 0.5 and 5 weight percent of a superfatting material; together with

(c) acid sufficient to provide a pH between about 2.2 and about 3.2 in said composition.

4,986,984

HIGHLY SOLUBILIZED PROTEIN AND PRODUCTION THEREOF

Nara Kiyoshi, Kyoto, and Honda Susumu, Takatsuki, both of Japan, assignors to Takeda Chemical Industries, Ltd., Osaka, Japan

Continuation of Ser. No. 693,176, Jan. 22, 1985, abandoned. This application Sep. 23, 1988, Ser. No. 250,973
Claims priority, application Japan, Jan. 22, 1984, 59-10858; Jan. 9, 1985, 60-2586
Int. Cl.[5] A61K *45/02;* C07K *13/00;* C12P *21/00*
U.S. Cl. 424—85.5 17 Claims

1. A method for producing a highly concentrated human γ-interferon aqueous solution containing noncovalent dimer of human γ-interferon, which comprises removing a protein-denaturing agent from an aqueous solution of human γ-interferon at a concentration of from about 30 to about 200 μg/ml and containing the protein-denaturing agent, aging the resulting solution in situ at from about 0° C. to about 40° C. for from about 0.5 to about 7 days and concentrating the same.

4,986,985

METHOD OF TREATING SKIN VIRUS INFECTIONS

Shlomo Grossman, and Michael Albeck, both of Ramat Gan, Israel, assignors to Bar Ilan University, Ramat Gan, Israel

Filed Nov. 2, 1987, Ser. No. 116,368
Int. Cl.[5] A61K *35/78*
U.S. Cl. 424—195.1 38 Claims

1. A method for treating warts, which comprises applying to skin having warts thereon, a water soluble antioxidant material of plant origin which is characterized by stability for an extended period of time under ambient temperature and pressure, at least in the dry state, and by the fact that it provides an antioxidant effect when applied to the skin, said material of plant origin having been obtained by a step of water extraction of tissue selected from stem and leaf tissue from plants selected from the group consisting of Trifolium, Medicago, Nicotiana, Zea, Pennisetum, Algae and Allium, and members of the order Chenopodiales.

4,986,986

SKIN MOISTURIZING AND OIL RESTORING LOTION

Nora Roth, S.I.P. Inc., P.O. Box 9511, Alexandria, Va. 22304

Continuation-in-part of Ser. No. 238,258, Aug. 30, 1988, abandoned. This application May 15, 1989, Ser. No. 351,690
Int. Cl.[5] A61K *35/78, 31/20*
U.S. Cl. 424—195.1 2 Claims

1. A skin moisturizing and oil restoring composition consisting essentially of:

(A) 40 to 55% by volume of peanut oil,

(B) 15 to 22% by volume of olive oil,

(C) 10 to 20% by volume of anhydrous lanolin,

(D) 20 to 30% by volume of rose water, and

(E) 0.35 to 0.65% by volume of lemon oil,

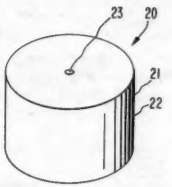
based on the volume of the composition.

4,986,987

PULSED DRUG DELIVERY

Atul D. Ayer, Mountain View; Felix Theeuwes, Los Altos, and Patrick S. L. Wong, Hayward, all of Calif., assignors to Alza Corporation, Palo Alto, Calif.

Division of Ser. No. 861,188, May 9, 1986, Pat. No. 4,842,867. This application Feb. 21, 1989, Ser. No. 312,845
Int. Cl.[5] A61K *9/24*
U.S. Cl. 424—473 3 Claims



1. A dosage form useful for the relief of motion sickness, said dosage form comprising:

(a) a wall comprising in at least a part a semipermeable composition permeable to the passage of an external fluid and substantially impermeable to the passage of drug formulation; which wall surrounds:

(1) a first layer comprising a timed delayed dosage amount of a dimenhydrinate formulation;

(2) a second layer comprising a hydrogel formulation that increases in volume in the presence of fluid;

(3) means for the timed delay of dimenhydrinate formulation from the interior of the dosage form interposed between the wall and the first layer;

(b) exit means in the wall for releasing the timed delayed dose of dimenhydrinate formulation from the dosage form; and,

(c) a dosage amount of a first immediate dose of dimenhydrinate on the exterior wall of the dosage form.

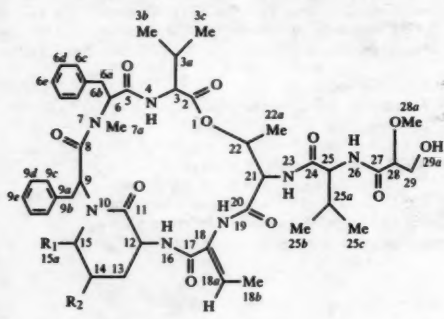
4,986,988

ISOLATION AND STRUCTURAL ELUCIDATION OF THE CYTOSTATIC LINEAR DEPSIPEPTIDES DOLASTATIN 13 AND DEHYDRODOLASTATIN 13

George R. Pettit, Paradise Valley, and Yoshiaki Kamano, Tempe, both of Ariz., assignors to Arizona Board of Regents, Tempe, Ariz.

Filed May 18, 1989, Ser. No. 353,960
Int. Cl.[5] A01N *63/02, 27/00*; A61K *31/015*
U.S. Cl. 424—520 4 Claims

1. A cell growth inhibitory substance denominated dolastatin 13 having the structural formula:



wherein: R_1=OH; R_2=H.

4,986,989

ZEOLITE FUNGICIDE

Masao Sirosita, Nishinomiya; Masato Mizutani, Toyonaka; Shigeko Kimura, Otsu, all of Japan; Yukio Oguri, Chaville, France; Masaru Kitamura; Youichi Umada, both of Takatsuki, Japan, and Hiroshi Sato, Niihama, Japan, assignors to Sumitomo Chemical Company, Limited, Osaka, Japan

Filed Aug. 26, 1988, Ser. No. 236,715
Claims priority, application Japan, Sep. 4, 1987, 62-222293
Int. Cl.[5] A01N *59/20*
U.S. Cl. 424—635 4 Claims

1. An agricultural and horticultural fungicide consisting essentially of a fungicidally effective amount of at least one crystalline zeolite selected from the group consisting of faujasite group and phillipsite group represented by the formula

$$aCuO\cdot(1-a)M_2O\cdot Al_2O_3\cdot bSiO_2o19\ cH_2O$$

wherein M represents sodium and/or potassium, and a is a number greater than 0 and less than or equal to 1, b is a number greater than 3 and less than or equal to 12, and c is a number greater than or equal to 0 and less than or equal to 20, together with an inert carrier.

4,986,990

DISINFECTION METHOD AND COMPOSITION THEREFOR

Eugene A. Davidson, Hummlestown, Pa., and Robert D. Kross, Bellemore, N.Y., assignors to Alcide Corporation, Farmingdale, N.Y.

Continuation of Ser. No. 850,009, Apr. 10, 1986, abandoned, which is a continuation-in-part of Ser. No. 790,436, Oct. 23, 1985, abandoned, which is a continuation of Ser. No. 591,787, Mar. 21, 1984, abandoned. This application Oct. 11, 1989, Ser. No. 420,651
Int. Cl.[5] A01N *59/08*
U.S. Cl. 424—665 13 Claims

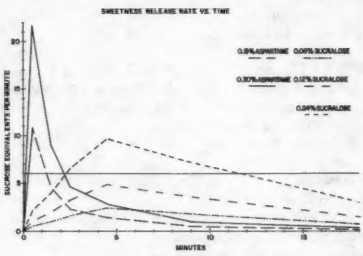
1. A chlorous acid generating composition comprising an aqueous solution consisting essentially of from about 0.01% to about 6% by weight of an organic acid, wherein the pK of the organic acid is from about 2.8 to about 4.2, and wherein the organic acid is not lactic or citric acid, and from about 0.0001% to about 0.45% by weight based upon the total weight of said composition of a metal clorite, such that the chlorite ion concentration in the form of chlorous acid is not more than about 15% by weight of the total amount of chlorite ion concentration.

4,986,991

CHEWING GUM HAVING AN EXTENDED SWEETNESS

Robert Yatka, Orland Park; Patrick Prombo, Homewood; Roman M. Barabolak, Westchester; Steven Zibell, Palos Heights, and Gordon N. McGrew, Evanston, all of Ill., assignors to Wm Wrigley, Jr., Company, Chicago, Ill.

Continuation-in-part of Ser. No. 50,534, May 15, 1987, abandoned, and a continuation-in-part of Ser. No. 50,626, May 15, 1987, abandoned, and a continuation-in-part of Ser. No. 50,627, May 15, 1987, abandoned. This application Jul. 5, 1989, Ser. No. 376,037
Int. Cl.[5] A23G *3/30*
U.S. Cl. 426—3 24 Claims



1. A chewing gum composition comprising a mixture of chewing gum ingredients comprising between about 10 and 50 weight percent chewable gum base and an effective amount of sweetener comprising 4,1',6'-trichloro-4,1',6'-trideoxy-galactosucrose (TGS), said composition comprising greater than about 0.07 weight percent TGS and said gum base comprising between about 5 and 40 weight percent polyvinyl acetate, about 7 and 30 weight percent wax, and about 0 and 20 weight percent fats and oils.

4,986,992

PARTIALLY BAKED CROISSANT AND PASTRY AND METHOD OF MANUFACTURE

Timothy L. Glaros, Bloomington, Minn.; Florent Soissons, Alexandria, Va., and Joe McEvoy, Honolulu, Hi., assignors to Vie de France Bakery Corporation, McLean, Va.

Filed Nov. 10, 1988, Ser. No. 269,414
Int. Cl.[5] A21D *13/00*
U.S. Cl. 426—19 19 Claims

1. A method of making a partially baked, laminated dough product, said laminated dough including from 9 to 64 layers of fat, comprising the steps of:

preparing an unbaked, laminated dough product;

heating said unbaked, laminated dough product to form a partially baked, laminated dough product having a core temperature of between about 200° F. to 210° F., said partially baked, laminated dough product having increased in size to a final desired configuration;

immediately freezing said partially baked, laminated dough product, the outside surface of the partially baked, laminated dough product being cooled from said temperature

of between about 200° F. to 210° F. to a temperature of about 25° F. or less within about two minutes, whereby

the structure of the partially baked, laminated dough product does not collapse,

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4,986,993

COMPOSITION AND METHOD FOR CONDITIONING GRAIN

Michael J. Chanen, St. Louis Park, Minn., assignor to Cargill, Incorporated, Minneapolis, Minn.

Filed Sep. 28, 1989, Ser. No. 413,870
Int. Cl.[5] A23B *9/00*
U.S. Cl. 426—93 27 Claims

1. A grain conditioner composition for treating grain prior to rolling the grain into flakes to increase water uptake and gelatinization consisting essentially of

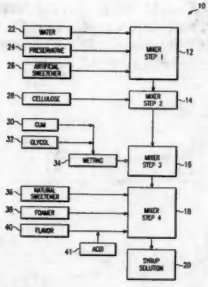
an aqueous solution of a nonionic surfactant and a water soluble base, said base being present at a level sufficient to provide a pH of from about 9 to about 12.

4,986,994

PROCESS FOR MAKING A LOW CALORIE BEVERAGE

John B. Baccus, Jr., Irving, Tex., assignor to The Southland Corporation, Dallas, Tex.

Filed Apr. 21, 1989, Ser. No. 341,781
Int. Cl.[5] A23L *2/00*
U.S. Cl. 426—330.3 26 Claims



1. A process for preparing a low calorie beverage comprising the steps of:

mixing an artificial sweetener solution and microcrystalline cellulose in a mixer, said microcrystalline cellulose in an amount sufficient to lower the freezing point of the beverage to be prepared;

adding a natural sweetener to the mixer;

adding a nongaseous foaming agent to the mixer to stabilize foam generated during future processing;

adding flavoring to the mixer to complete the formation of a syrup;

mixing filtered water, the syrup and carbon dioxide to create a mixture, foam generated during mixing being stabilized by said foaming agent;

regulating the temperature of a freeze cylinder to between approximately 26 degrees and 28 degrees Fahrenheit;

transferring said mixture of said water, the syrup and said gas to a freeze cylinder;

mixing said mixture of said water, the syrup and said gas in the freeze cylinder until small ice crystals form throughout said mixture; and

pouring said mixture of said water, the syrup and said gas out of the freeze cylinder to obtain the low calorie beverage.

4,986,995

PROCESS FOR PRODUCING RETORT BOILED RICE

Yukio Kobayashi; Hitoshi Sasaki; Norishige Matsuo, and Mitsuru Ohba, all of Kawasaki, Japan, assignors to Ajinomoto Co., Inc., Tokyo, Japan

Filed Dec. 22, 1989, Ser. No. 454,934
Claims priority, application Japan, Dec. 23, 1988, 63-320401; Nov. 30, 1989, 1-311717
Int. Cl.[5] A23B *9/02, 9/20*
U.S. Cl. 426—412 5 Claims

1. A process for producing retort boiled rice comprising the steps of:

charging raw rice and water into a container;

adjusting the quantity of oxygen in the head space of said container above the rice and water to a level of 4 to 12 ml per 100 g of raw rice by adding an inert gas to said head space;

sealing said container to enclose said raw rice, water, inert gas and said head space oxygen level; and then

boiling and, at the same time, retort sterilizing said raw rice in said sealed container.

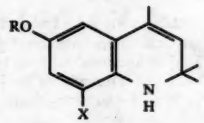
4,986,996

ETHOXYQUIN DERIVATIVES AS ANTIOXIDANTS IN EDIBLE OILS AND FISH MEAL

Stuart M. Barlow, Hoddesdon, Great Britain; Frank D. Gunstone, Cupar; Roy Hardy, Aberdeen, both of Scotland, and Snorri Thorisson, Reykjavik, Iceland, assignors to University of St. Andrews, Scotland

Filed Jul. 6, 1989, Ser. No. 376,285
Claims priority, application United Kingdom, Jul. 8, 1988, 8816269
Int. Cl.[5] A23B *4/14;* A23D *5/04;* A23K *3/00*
U.S. Cl. 426—545 15 Claims

1. A composition comprising a natural or processed oil and an anti-oxidant amount of a compound of the formula



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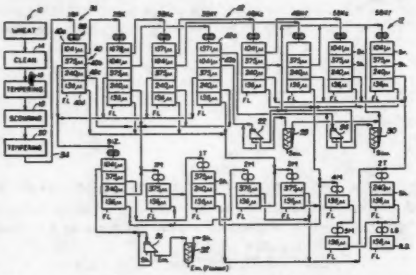
wherein R is C_{1-5} alkyl and X is not hydrogen but a substituent which prevents dimerisation of the compound on oxidation but does not substantially decrease the anti-oxidant effect of the compound below that when X is H.

4,986,997

METHOD OF SEPARATING WHEAT GERM FROM WHOLE WHEAT

Elieser S. Posner, Manhattan, Kans., and Yuzhou Li, Zengzhou, China, assignors to Kansas State University Research Foundation, Manhattan, Kans.

Filed Apr. 19, 1989, Ser. No. 340,495
Int. Cl.[5] B02C *4/00, 9/00*
U.S. Cl. 426—622 8 Claims



1. A method of separating both the embryo and scutellum fractions from wheat to thereby increase the yield of wheat germ from the wheat and to produce wheat flour from the resultant wheat, said method comprising the steps of:

initially tempering said wheat to an initial total moisture content adapted to permit maximum impact detachment of embryo from the wheat;

detaching embryo from said initially tempered wheat by subjecting the wheat to a mechanical impact sufficient to free a substantial part of said embryo from the wheat while leaving most of the scutellum fraction attached thereto;

separating at least a portion of said detached embryo from the deembryonated wheat, and collecting said separated embryo;

subjecting the deembryonated wheat to a second tempering step to increase the moisture content thereof to a second moisture content that is higher than the initial moisture content and that is adapted to permit maximum detachment of scutellum from the deembryonated wheat; and

separating a substantial part of the scutellum fraction from the deembryonated wheat, including the steps of passing the deembryonated wheat through at least one pair of break rolls, collecting said separated scutellum, and processing the wheat into wheat flour.

4,986,998

PROCESS FOR MANUFACTURING DEHYDRATED FLAVORING FROM LIVESTOCK BLOOD

Ick-Jong Yoo, Ansan; Kyung-Hwan Kim, and Young-Eon Kim, both of Seoul, all of Rep. of Korea, assignors to Korea Food Research Institute, Kyounki, Rep. of Korea

Filed Jan. 26, 1990, Ser. No. 470,700
Claims priority, application Rep. of Korea, Nov. 22, 1989, 16987
Int. Cl.[5] A23L *1/221*
U.S. Cl. 426—647 1 Claim

1. A process for manufacturing dehydrated flavorings from livestock blood, the process comprising the steps of:

(a) hydrolyzing blood of livestock for 6–24 hours at a temperature of 100–110° C. after mixing 30–70% (V/V) of 4–10N hydrochloric acid solution with the blood to produce a hydrolyzed suspension;

(b) neutralizing said suspension from step (a) at a pH 4.8–6.2 by contacting the suspension with 6–12N caustic soda solution to produce a neutralized suspension;

(c) decolorizing and deodorizing said neutralized suspension of step (b) by contacting the suspension with granulated active charcoal for 15–25 minutes per unit volume to produce a decolorized and deodorized suspension;

(d) removing salt from said decolorized and deodorized suspension from step (c) by ultrafiltration or vacuum concentration to produce a desalted suspension;

(e) heating said desalted suspension from step (d) for 1–4 hours at a temperature of 95°–170° C., after adding 3–5% by weight of sugars, to produce a heated suspension;

(f) spray drying said heated suspension of step (e)to form a power having a 35–45% solid content; and

(g) seasoning said powder produced from step (f).

4,986,999

ANTI-DENATURATION AGENT FOR EDIBLE PASTE PRODUCT

Takashi Takasaki, Karatsu; Reikichi Yanai, Osaka; Shigeru Amakawa, Nishinomiya; Yoichi Takizawa, Mishima, and Akira Iwamoto, Karatsu, all of Japan, assignors to Nihon Bussan Kabushiki Kaisha, Karatsu, Japan

Filed Jul. 18, 1988, Ser. No. 219,747
Claims priority, application Japan, Jul. 20, 1987, 62-178886
Int. Cl.[5] A23L *1/327*
U.S. Cl. 426—656 9 Claims

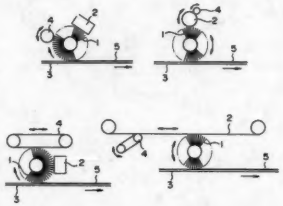
1. An anti-denaturation agent to be added to an edible paste product which comprises a protein decomposition extract obtained by decomposition of protein by proteinase and a saccharide as essential active ingredients, said protein decomposition extract containing a mixture of a peptide consisting of amino acids and having a molecular weight of not higher than 3000, and a mixture of free amino acids, said protein decomposition extract being obtained by elevating a temperature of a raw material selected from the group consisting of fish, shellfish, meat and mixtures thereof, to thereby deactivate autolysis enzymes, adding at least one proteinase to decompose said raw material into said mixture of peptide and said mixture of free amino acids and separating a liquid protein decomposition extract from an oil layer and undecomposed materials.

4,987,000

MECHANICAL PLATING PROCESS

Yoshikazu Koshiba; Yuji Ikegami; Noboru Tachino, and Takeshi Kamiya, all of Kawasaki, Japan, assignors to Nippon Yakin Kogyo Co., Ltd., Tokyo, Japan

Filed Dec. 12, 1988, Ser. No. 282,681
Claims priority, application Japan, Dec. 21, 1987, 62-321345; Jul. 6, 1988, 63-166956; Jul. 6, 1988, 63-166957
Int. Cl.[5] B05C *11/00*
U.S. Cl. 427—11 4 Claims



3. A mechanical plating process comprising shaving metal off from a pure metal or alloy block and plating a metallic object to be plated with said shaved off metal by the use of at least a single metal brush, wherein said metal block and said metal brush are in frictional contact with each other, and said object to be plated and said metal brush are concurrently in frictional contact with each other, characterized by continuously conducting said mechanical plating process while moving said metal block in such a way that a fresh surface of the metal block is kept in contact with said metal brush, and while

removing small metal particles from said metal brush with a grinder or a cutting tool, said small metal particles being shaved off from said metal block but not yet plated on said object and still clinging to said metal brush.

4,987,001

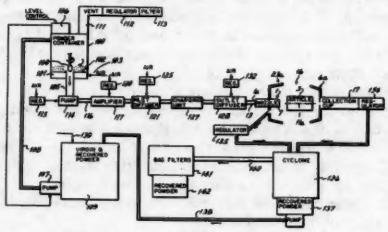
METHOD AND APPARATUS FOR COATING THE INTERIOR SURFACE OF HOLLOW, TUBULAR ARTICLES

Alan J. Knobbe, Lorain, Ohio; Joseph A. E. Pintelon, Lennik, Belgium, and Daniel Pinault, Niederkruchten, Fed. Rep. of Germany, assignors to Nordson Corporation, Westlake, Ohio

Filed Feb. 9, 1989, Ser. No. 308,897

Int. Cl.[5] B05D *1/06, 7/22;* B05B *5/12*

U.S. Cl. 427—28 **22 Claims**



1. A method of applying a solid particulate powder coating to the interior surface of hollow, tubular articles, each of which tubular articles has an axis and two open ends, which method comprises

moving said articles to a spray station,

locating a spray nozzle at said spray station adjacent a first open end of each of said articles,

locating a collection shroud at said spray station adjacent a second open end of each of said articles,

at said spray station, directing a stream of air-entrained powder into a first open end of each of said articles while applying a vacuum to said collection shroud in order to collect oversprayed powder from said articles through said second open end, and

applying an electrostatic charge to said powder upstream of said nozzle so that the powder is electrostatically charged when it emerges from said nozzle.

4,987,002

PROCESS FOR FORMING A CRYSTALLINE DIAMOND FILM

Masakatu Sakamoto, Hachiohji; Youichi Yaguchi, Tokyo; Hiroaki Toshima, Ibaragi, and Toshiroh Kotaki, Tokyo, all of Japan, assignors to Kabushiki Kaisha Kenwood and Namiki Precision Jewel Co., Ltd., both of Tokyo, Japan

Filed May 4, 1989, Ser. No. 347,027

Claims priority, application Japan, May 9, 1988, 63-110510

Int. Cl.[5] B05D *1/08;* C23C *16/00*

U.S. Cl. 427—34 **17 Claims**

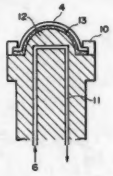
1. A crystalline diamond film forming process comprising the steps of:

arranging a pedestal cooled with cooling facility during the film forming process;

positioning a thin substrate on said pedestal with an intermediate layer which is interposed between the pedestal and the substrate, the intermediate layer comprising a thermally conductive powder;

feeding a mixture of gas composed of argon, a hydrocarbon, and hydrogen to a thermal plasma generating means; and

applying energy to the gas mixture via said thermal plasma generating means to produce decomposed carbon parti-



cles and depositing the carbon particles onto the substrate to form a crystalline diamond film.

4,987,003

PRODUCTION OF ALUMINUM MATRIX COMPOSITE COATINGS ON METAL STRUCTURES

David M. Schuster, Lajolla, Calif.; Harvey Fisher, Lexington, Mass.; Pierre Cinq-Mars, Toronto, Canada, and Bernard Altshuller, Kingston, Canada, assignors to Alcan International Limited, Montreal, Canada

Continuation-in-part of Ser. No. 164,234, Mar. 4, 1988, abandoned. This application Dec. 22, 1988, Ser. No. 288,789

Int. Cl.[5] B05D *3/06*

U.S. Cl. 427—37 **11 Claims**

1. A method of producing a corrosion and mechanical wear resistant coating on a metal surface to be protected which comprises (a) providing a rod or wire formed of a metal matrix composite comprising a metal matrix having distributed therein a finely divided solid filler material and (b) applying a coating of said metal matrix composite on said metal surface to be protected by means of a flame spraying or arc spraying process.

4,987,004

PLASMA PROCESSING METHOD AND APPARATUS

Shunpei Yamazaki; Mitsunori Tsuchiya; Atsushi Kawano; Shinji Imatou; Kazuhisa Nakashita; Toshiji Hamatani; Takashi Inushima, all of Atsugi, and Kenji Itou, Zama, all of Japan, assignors to Semiconductor Energy Laboratory Co., Ltd., Kanagawa, Japan

Division of Ser. No. 303,240, Feb. 3, 1989. This application May 11, 1990, Ser. No. 522,129

Claims priority, application Japan, Feb. 5, 1988, 63-25919; Feb. 5, 1988, 63-25920; May 13, 1988, 63-117792; Aug. 26, 1988, 63-212894; Oct. 11, 1988, 63-255489

Int. Cl.[5] B05D *3/06*

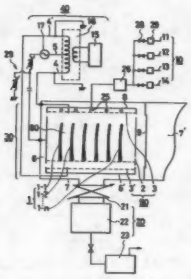
U.S. Cl. 427—38 **16 Claims**

1. A plasma processing method comprising:

disposing in a reaction space a plurality of printing drums where each drum has a photosensitive coating disposed thereon;

supplying a reactive gas comprising carbon into said reaction space wherein said reaction space is defined between a pair of electrodes where a first high frequency power source is connected to the first of said pair of electrodes and a second high frequency power source is connected to

the second of said pair of electrodes and where the first high frequency power source is phase shifted with respect to the second high frequency power source;



inducing a plasma of the reactive gas in said reaction space by actuating said first and second high frequency power sources; and

forming a carbon containing coating on each of the photosensitive coatings of the printing drums.

4,987,005

CHEMICAL VAPOR PROCESSING METHOD FOR DEPOSITION OR ETCHING ON A PLURALITY OF SUBSTRATES

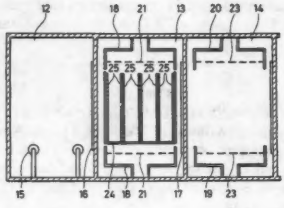
Kunio Suzuki; Takeshi Fukada, both of Tokyo; Mikio Kinka, Kanagawa; Masayoshi Abe, Tokyo; Katsuhiko Shibata, Hamamatsu; Masato Susukida, Atsugi; Noriya Ishida, Hase-Atsugi; Akemi Satake, Hase-Atsugi, and Yasuyuki Arai, Kanagawa, all of Japan, assignors to Semiconductor Energy Laboratory Co., Ltd., Atsugi, Japan

Continuation of Ser. No. 166,546, Mar. 10, 1988, abandoned, which is a continuation-in-part of Ser. No. 82,541, Aug. 7, 1987, abandoned. This application Aug. 21, 1989, Ser. No. 396,795

Claims priority, application Japan, Aug. 8, 1986, 61-186203

Int. Cl.[5] B05D *5/12*

U.S. Cl. 427—39 **11 Claims**



1. A method of coating an object with a film comprising:

disposing said object in a reaction chamber;

inputting a reactive gas into said reaction chamber; and

applying an electric power to said reactive gas in order to initiate a reaction of said reactive gas and form a film by deposition of the product of said reaction,

wherein the magnitude of said electric power is amplitude modulated between different non-zero levels to provide a substantially uniform thickness of said film on said substrate, the speed of deposition being lower at a center portion than that at a peripheral portion of said substrate at one non-zero power level and the speed of deposition being higher at said center portion than that at said peripheral portion of said substrate at another non-zero power level.

4,987,006

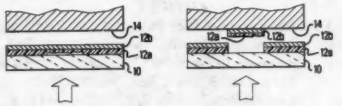
LASER TRANSFER DEPOSITION

Richard T. Williams, Winston-Salem; David B. Wrisley, Jr., Greensboro, and Jeff C. Wu, Clemmons, all of N.C., assignors to AMP Incorporated, Harrisburg, Pa.

Filed Mar. 26, 1990, Ser. No. 498,875

Int. Cl.[5] B05D *3/06, 5/12*

U.S. Cl. 427—53.1 **8 Claims**



1. In a method for producing a smooth and continuous pressure bonded layer of a material, selected from the group consisting of conductive, semiconductive, superconductive and insulating materials, on a base material through the driving force of a pulsed laser, the improvement comprising in combination therewith the steps of

(a) selecting a laser transparent substrate,

(b) applying thereto a thin polymeric film, where said polymer is characterized by a high optical coefficient of absorption to the wavelength of said laser,

(c) applying to said polymeric film a thin layer of said material for pressure bonding to said base material,

(d) placing said base material in close proximity to said thin layer of material, and

(e) directing pulsed laser energy through said transparent substrate toward said polymeric film and said layer of material to be pressure bonded, whereby said laser energy is absorbed by said polymer causing heating and vaporization thereof to a controlled depth of said polymeric film, leaving remaining portions of said polymeric film unvaporized after said depth, to act as support for said thin layer of material to be pressure bonded, said vaporization providing the necessary pressure to blow-off said remaining portions of polymeric film, whereby to propel said material for pressure bonding on to said base material.

4,987,007

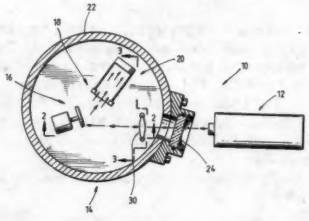
METHOD AND APPARATUS FOR PRODUCING A LAYER OF MATERIAL FROM A LASER ION SOURCE

Suhas S. Wagal, and Carl B. Collins, both of Richardson, Tex., assignors to Board of Regents, The University of Texas System, Austin, Tex.

Filed Apr. 18, 1988, Ser. No. 183,022

Int. Cl.[5] B05D *3/06;* C23C *16/48*

U.S. Cl. 427—53.1 **63 Claims**



1. An apparatus for producing a layer of material comprising:

laser means selectably operable for directing a laser beam along a first path of travel;

a chamber;

means for creating a vacuum within said chamber;

means for holding a target material at a target location within the chamber generally along the first path of travel;

focusing means disposed along said first path of travel for focusing the laser beam at the target location to eject and ionize a portion of the target material;

electrode means disposed within the chamber and chargeable at an electrical potential and positioned adjacent ions and trailing free electrons for separating and moving said ions and electrons from the target location along a second path of travel within the chamber; and

means for supporting a substrate disposed along the second path of travel with the chamber for collecting ions and trailing free electrons on the substrate to produce a layer of material on the substrate.

17. A method for producing a layer of material comprising the steps of:

positioning a first target of first material in a chamber;

creating a vacuum within the chamber enveloping the first target;

directing a laser beam at the first target;

focusing the laser beam on the first target;

ablating a portion of the first target with the laser beam focused on the target to eject a plume of the first target material;

ionizing part of the plume with the laser beam impacting the plume to create ions and trailing free electrons in the region of the plume;

moving at least some of the ions and trailing free electrons from the region towards a charged potential within the chamber along an ion path of travel;

positioning a substrate along the ion path of travel; and

collecting the ions and trailing free electrons on the substrate to form a layer of material on the substrate.

4,987,008

THIN FILM FORMATION METHOD

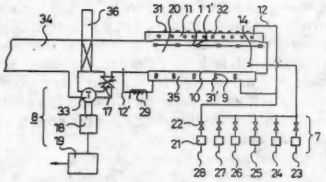
Shunpei Yamazaki, Tokyo; Kazuo Urata, Kanagawa; Mamoru Tashiro; Yuji Tanamura, both of Tokyo, and Shinji Imato, Kanagawa, all of Japan, assignors to Semiconductor Energy Laboratory Co., Ltd., Kanagawa, Japan

PCT No. PCT/JP86/00328, § 371 Date Mar. 2, 1987, § 102(e) Date Mar. 2, 1987, PCT Pub. No. WO87/00346, PCT Pub. Date Jan. 15, 1987

Continuation of Ser. No. 34,288, Mar. 2, 1987, abandoned. This PCT application Jun. 27, 1986, Ser. No. 357,644

Int. Cl.[5] B05D *3/06*; B44C *1/22*

U.S. Cl. 427—53.1 **6 Claims**



1. A thin film formation method characterized by a process which cleans a surface of a semiconductor substrate by the removal of oxides and dirt without damaging the surface by exposing the surface to active hydrogen generated from the photochemical decomposition of hydrogen or nonoxide hydrides, and a subsequent process that forms a thin film of nonoxides on the substrate.

4,987,009

PRODUCING METHOD OF THICK FILM COMPLEX COMPONENT

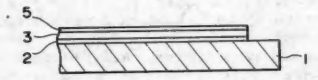
Kiichi Nakamura, Yachiyo; Masami Itakura; Yasuhiko Atsumi, both of Kawasaki; Hideo Watanabe, Chiba, and Youiti Kanagawa, Katsushika, all of Japan, assignors to TDK Corporation, Tokyo, Japan

Continuation of Ser. No. 255,141, Oct. 7, 1988, abandoned. This application Nov. 13, 1989, Ser. No. 436,124

Claims priority, application Japan, Oct. 9, 1987, 62-254879

Int. Cl.[5] C23C *26/00*

U.S. Cl. 427—96 **11 Claims**



1. A method of producing a thick film complex electronic component including an inductance and a capacitance, having at least a substrate, and a conductive pattern and a magnetic film pattern for electrode of said capacitance and wires of said inductance and a dielectric layer for said capacitance, comprising the steps of:

depositing a first thick film conductive pattern directly on a ceramic substrate,

depositing a paste of ferrite material which is not magnetic ferrite directly on said conductive pattern, so that a plurality of holes are provided on a film of said ferrite material,

sintering said ferrite material at a temperature in the range between 600° C. and 1200° C. to product magnetic dielectric ferrite film , and

depositing a second thick film conductive pattern on the ferrite film thus sintered so that said second conductive pattern is electrically connected to said first conductive pattern through holes in the ferrite film to provide an inductance by wires of said first conductive pattern and said second conductive pattern and a magnetic ferrite film in said wires, and a capacitance between said first conductive pattern and said second conductive pattern through the ferrite film which is dielectric.

4,987,010

METHOD FOR MANUFACTURING A FILM RESISTOR

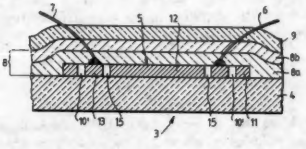
Hans Krause, Ban Nauheim, and Helmut Stoll, Liederbach, both of Fed. Rep. of Germany, assignors to Leybold AG, Fed. Rep. of Germany

Filed Sep. 25, 1989, Ser. No. 411,736

Claims priority, application Fed. Rep. of Germany, Mar. 1, 1989, 3906405

Int. Cl.[5] B05D *5/12*

U.S. Cl. 427—103 **17 Claims**



1. A method for fabricating a film resistor comprising the steps of:

depositing a resistance layer on a surface of an insulating carrier;

cleaning said resistance layer and said surface of said insulating carrier using an argon sputtering process;

depositing a plasma-enhanced CVD protective layer on said resistance layer and said surface of said insulating carrier.

4,987,011

METHOD FOR PRODUCING A SILICON CARBIDE COATED CLAY

Camilla A. Rice, Sandersville, Ga., assignor to ECC America Inc., Atlanta, Ga.

Filed Nov. 3, 1988, Ser. No. 266,783
Int. Cl.[5] B05D 7/00
U.S. Cl. 427—215 7 Claims

1. A method for forming silicon carbide on the surface of a layered lattice silicate having the general formula $E_lM_xSi_yO_n(OH)_m$, where M is Al, Mg, or Fe; $x=2$ to 6; $y=2$ to 8; $n=2$ to 20; $m=0$ to 8; and E_l is one or more exchangeable ions, which comprises:

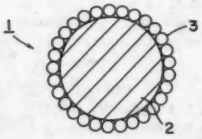
reacting said layered lattice silicate in particulate form in the presence of a carbon source with a gaseous reactant comprising hydrogen as the essential active ingredient, and in the absence of substantial amounts of nitrogen, at temperature in the range of about 1000° to 1150° C. to form silicon carbide at said surface.

4,987,012

PROCESS FOR PREPARING MONO-DISPERSED PARTICLES

Goro Sato; Michio Komatsu; Hiroyasu Nishida; Yoshichika Tanaka; Tsuguo Koyanagi, all of Fukuoka, and Kei-ichi Mihara, Chiba, all of Japan, assignors to Catalysts & Chemicals Industries Co., Ltd., Tokyo, Japan

Division of Ser. No. 206,863, Jun. 13, 1988, Pat. No. 4,925,704, which is a continuation-in-part of Ser. No. 13,422, Feb. 11, 1987, abandoned. This application Apr. 18, 1990, Ser. No. 511,197
Claims priority, application Japan, Feb. 12, 1986, 61-28360; Aug. 20, 1986, 61-194936; Oct. 2, 1986, 61-235340; Oct. 9, 1986, 61-240431
Int. Cl.[5] B05D 7/00
U.S. Cl. 427—221 10 Claims



1. A process for preparing particles used as spacers for a display device, which comprises hydrolyzing a metal alkoxide by adding said metal alkoxide to a dispersion of a water-alcohol system having dispersed therein a metal oxide or metal hydroxide as a seed, while maintaining said dispersion under alkaline conditions, allowing a decomposition product of said metal alkoxide to attach onto said seed, thereby effecting particle growth of the seed, and subsequently coating particles, separated from the dispersion, on the surface thereof with a synthetic resin.

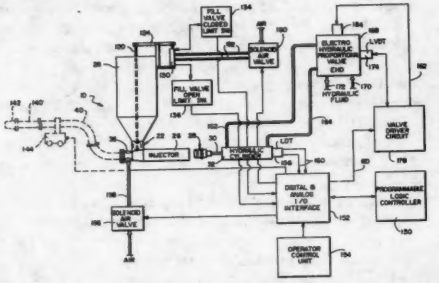
4,987,013

PROCESS FOR LINING PIPE

Tom G. Atkins; Don E. Gray, both of Birmingham, and George H. Styles, Kimberly, all of Ala., assignors to American Cast Iron Pipe Company, Birmingham, Ala.

Division of Ser. No. 225,779, Jul. 29, 1988, Pat. No. 4,913,089. This application Jan. 8, 1990, Ser. No. 461,818
Int. Cl.[5] B05C 7/02
U.S. Cl. 427—233 5 Claims

1. A process for lining pipe comprising inserting at a controlled speed a spray lance into the interior of a length of pipe to be lined; supplying lining material to the spray lance so as to deposit the lining material on an interior surface of the pipe; and rotating the pipe to distribute the lining material about the inner surface and the compact the lining material, said supplying comprising drawing lining material from a source into an injector tube having a moveable plunger therein, and pumping



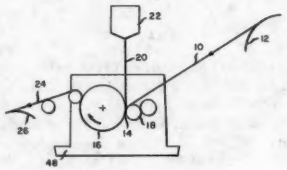
the lining material to the spray lance by moving the plunger inwardly a predetermined amount and at a controlled rate in synchronism with the insertion of the spray lance into the pipe so as to supply a predetermined quantity of lining material to the spray lance to provide a lining having a desired thickness.

4,987,014

CHILL ROLL PRINTING

Antony I. Woodward, Pulaski, and Stephen M. Simpson, Clay, both of N.Y., assignors to Felix Schoeller jr GmbH & Co. KG, Osnabrück, Fed. Rep. of Germany

Filed Feb. 24, 1989, Ser. No. 315,444
Int. Cl.[5] B05D 5/00, 5/06
U.S. Cl. 427—278 23 Claims



1. A method for marking or printing onto a back side of a polyolefin-coated imaging base paper, comprising

mounting a pressure roll onto a machine frame; mounting a chill cylinder roll, with patterns or symbols etched into the surface of the chill cylinder roll, where a height level difference and a chill cylinder roll surface structure difference exists between the chill cylinder roll surface, on the one hand, and the patterns or symbols etched or engraved onto the chill cylinder roll surface, on the other hand, whereby the height-level difference measured at the chill cylinder roll, amounts to from about 3 to 8 micrometers, onto the machine frame to be disposed in parallel to the pressure roll, thereby forming a nip between the pressure roll and the chill cylinder roll;

passing raw base paper through the said nip between the pressure roll and the chill cylinder roll;

bringing a polyolefin coating mass as a film through said nip between the chill cylinder roll and the pressure roll onto the back surface of the raw-base paper not to be covered with light sensitive layers for generating simultaneously an image of the surface structure of the chill cylinder roll on the polyolefin coating,

and where the chill cylinder roll surface structure difference causes a gloss difference of the coated paper between areas corresponding to the pattern on the chill cylinder

roll surface and the surrounding areas of the chill cylinder roll surface and where this gloss difference between the patterns, stamped into the polyolefin coating of the base paper and the area of the coating surrounding the patterns or symbols, is such that the higher disposed surface areas of the chill cylinder roll have a structure resulting in generation of a higher gloss level in first regions on the coated paper as compared to second regions of the coated paper corresponding to the lower disposed surface areas of the chill cylinder roll,

wherein the gloss difference between the first regions and the second regions on the coated paper amounts to not less than 15, as measured with a measuring head under an angle of 60 degrees, according to standard ASTM D 523.

4,987,015

HEAT RESISTANT SYNTHETIC PLASTICS MATERIALS

Roy W. Buckley, Halberton, England, assignor to John Heathcoat & Company Limited, Devon, England

Filed May 31, 1988, Ser. No. 200,528

Claims priority, application United Kingdom, Jun. 2, 1987, 8712903

Int. Cl.[5] B05D *3/02*

U.S. Cl. 427—389.9 6 Claims

1. A method of treating an oxidation-prone synthetic polymeric textile material to render it resistant to elevated temperature in which a heat stabilizing agent comprising an organic antioxidant, each molecule of which contains a reactive hydrogen atom and does not become an oxidation radical on losing the hydrogen atom and replacing the hydrogen atom with a free radical from the polymer is diffused into the surface of the polymeric textile material.

4,987,016

COMPONENT FOR PRODUCING SEMICONDUCTOR DEVICES AND PROCESS OF PRODUCING IT

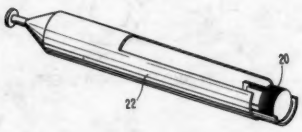
Takashi Ohto; Takashi Tanaka, and Makoto Sato, all of Yamagata, Japan, assignors to Toshiba Ceramics Co., Ltd., Tokyo, Japan

Filed Sep. 1, 1988, Ser. No. 239,609

Claims priority, application Japan, Sep. 1, 1987, 62-216490

Int. Cl.[5] B32B *3/00*

U.S. Cl. 428—34.1 15 Claims



1. A component, for producing semiconductor devices, comprising:

a component body made of a silicon carbide material;

a silica layer formed on a surface of the component body and having a thickness of 0.1 to 5 microns; and

a coating layer of silicon carbide formed on the silica layer and having a thickness of 50 to 1000 microns and less than 20 ppm of Fe.

4,987,017

THERMOPLASTIC ELASTOMER COMPOSITION AND FREON GAS HOSE MADE THEREOF

Hozumi Sato; Humito Shimada; Akio Sakaguchi; Yasuhiko Takemura; Tadaaki Nishi; Hisao Ono; Masanobu Nagano, and Takumi Miyachi, all of Tokyo, Japan, assignors to Japan Synthetic Rubber Co., Ltd., Tokyo, Japan

Continuation of Ser. No. 212,959, Jun. 27, 1988, abandoned. This application Feb. 28, 1990, Ser. No. 489,721

Claims priority, application Japan, Jun. 26, 1987, 62-159179; Aug. 11, 1987, 62-200380; Nov. 20, 1987, 62-293180

Int. Cl.[5] F16L *11/04, 11/08, 11/20*

U.S. Cl. 428—36.8 5 Claims

1. A gas hose for chlorofluorocarbons, chlorofluorohydrocarbons or fluorohydrocarbons, comprising a thermoplastic elastomer composition having oil-resistance and low-temperature resistance, and being resistant to chlorofluorocarbon, chlorofluorohydrocarbon or fluorohydrocarbon permeation, which comprises about 25–95% by weight of a polyamide and 75–5% by weight of a halogenated butyl rubber or a chlorosulfonated polyethylene.

4,987,018

JOINING POLYOLEFINIC MEMBERS BY FUSION

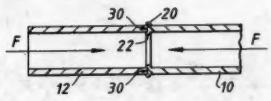
Alan J. Dickinson, Cramlington, and Trevor G. Stafford, Whiteley Bay, both of England, assignors to British Gas plc, London, England

Filed Feb. 21, 1989, Ser. No. 312,846

Claims priority, application United Kingdom, Feb. 19, 1988, 8803956

Int. Cl.[5] B29C *65/10, 65/18, 65/20*

U.S. Cl. 428—36.9 8 Claims



1. A method of joining by fusion first and second members composed respectively of first and second polyolefinic materials comprising heating respective surfaces of said members while said respective surfaces are separated from one another by means of a source of heat placed opposite to each said surface, removing the source of heat, engaging the heated surfaces with each other in mutual alignment at an interface and pressing said surfaces against each other, said second material having an MFI of zero or of extremely low value and only said first material being upset to form beads.

5. A pipe system comprising pipes and fittings, the pipes being joined as first members to the fittings as second members by butt fusion joints made in the field by the method according to claim 1.

4,987,019

GIFT WRAP DESIGN

Carolyn S. Jones, 2102 N. Vancouver, Tulsa, Okla. 74127

Filed May 28, 1985, Ser. No. 738,408

Int. Cl.[5] B32B *3/16*

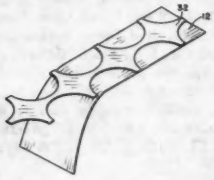
U.S. Cl. 428—42 5 Claims

1. A product for decorating gift packages which comprises:

a backing sheet;

a peelable design sheet on said backing and having a rear side and a first side, said first side being aesthetic, said design sheet having an adhesive material on the rear side thereof;

said design sheet having a plurality of rows of non-contiguous holes and including design building units having a first



side which is aesthetic and formed by cuts between selected holes of said design sheet.

4,987,020

HIGHLY ORIENTED THERMOTROPIC MAGNETIC RECORDING MEDIUM

Claude Bonnebat, Pontault-Combault; Jean-Pierre Quentin, Lyons, and Alain Morin, Villeurbanne, all of France, assignors to Rhone-Poulenc Chimie, Courbevoie, France

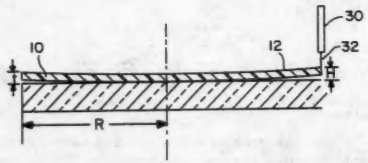
Continuation-in-part of Ser. No. 102,479, Sep. 29, 1987, abandoned.

Filed Oct. 10, 1989, Ser. No. 418,964

Claims priority, application France, Sep. 29, 1986, 86 13714

Int. Cl.[5] G11B *23/00*

U.S. Cl. 428—64 10 Claims



1. A smooth, thin, dimensionally stable, circular, rigid and planar substrate, adapted for receiving on at least one face surface thereof a magnetic coating material to form a magnetic recording medium, said substrate having an external diameter in the range of from about 70 millimeters to 360 millimeters, a thickness in the range of from about 1 to 2 millimeters, a relatively density of less than 1.8, a modulus of elasticity in the radial direction of from about 9000 Mpa to 18000 MPA, a coefficient of thermal expansion in the radial direction of from about 10 to 20 μm/m/°C., and a deformation temperature under load of at least 150° C., and said substrate being formed by injection molding a thermotropic aromatic polyester polymer having a flow temperature ranging from about 200° to 350° C. and an inherent viscosity of at least 1 dl/g in an injection mold fitted with a central injection system under the following molding conditions: (1) temperature of the molten polymer of from 280° C. to 350° C.; (2) injection pressure of from 80 to 160 Mpa; (3) temperature of the mold walls of from 100° C. to 200° C.; (4) an injection time of from 2 to 10 seconds; and (5) a holding pressure after injection of from 40 Mpa to 120 Mpa; whereby said thermotropic polymer is radially molecularly oriented and said substrate is substantially perfectly smooth as reflected in a surface roughness of less than 0.05 micron, and is substantially perfectly planar, as reflected in a warp angle of less than 1×10^{-5} radian.

4,987,021

OPTICAL INFORMATION RECORDING MEDIUM

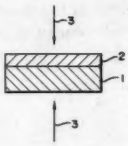
Toshiyuki Kanno, and Hitoshi Watanabe, both of Tokyo, Japan, assignors to Olympus Optical Co., Ltd., Tokyo, Japan

Continuation of Ser. No. 18,946, Feb. 24, 1987, abandoned. This application Jul. 13, 1989, Ser. No. 380,690

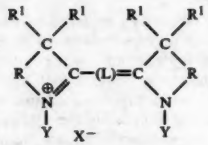
Claims priority, application Japan, Feb. 28, 1986, 61-43747; Feb. 28, 1986, 61-43748

Int. Cl.[5] B32B *3/00*

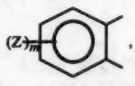
U.S. Cl. 428—64 21 Claims



1. An optical information recording medium comprising:
an optical information recording layer; and
a carrier for carrying said recording layer,
said recording layer comprising at least one organic dye represented by a formula:

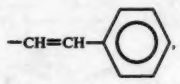


where R is

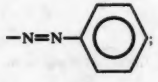


1,2-napththylene group, 2,3-naphthylene group, or 3,4-naphthylene group;

Z is a hydrogen atom, a halogen atom, an alkyl group having 1 to 18 carbon atoms, allyl group, nitro group, hydroxyl group, carboxyl group, an alkoxyl group, —OCF_3, —OSF_3, —R^2OH, —R^2CHO, —R^2COOH, —R^2OR^3, —R^2COR^3, —R^2COOR^3, —COR^3, —$COOR^3$,



—CH=CH—CN, —$NH_2N(R^3)_2$, —$NHCOCH_3$, or



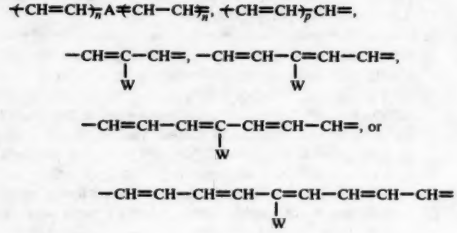
m is an integer of 1 to 4;

R^1 is an alkyl group having 1 to 6 carbon atoms, an aralkyl group, or phenyl group;

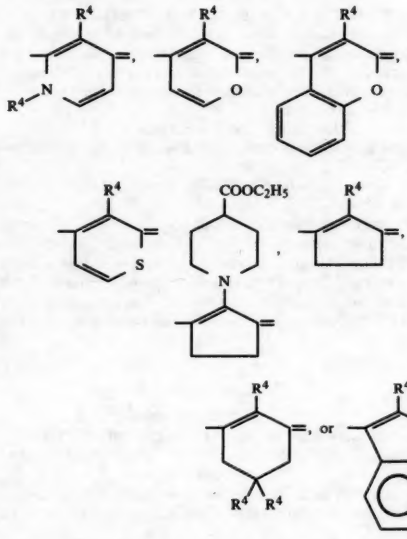
R^2 is an alkylene group having 1 to 20 carbon atoms;

R^3 is an alkyl group having 1 to 18 carbon atoms;

L is



n is 0, 1 or 2;
p is an integer of 1 to 4;



W is a monovalent group;
R^4 is a hydrogen atom, a halogen atom, an alkyl group having 1 to 6 carbon atoms, phenyl group, an aralkyl group, allyl group,

(where Ph is phenyl), or

R^5 is an alkyl group having 1 to 6 carbon atoms;
X is an anion; and
Y is unsaturated organic group having 2 to 20 carbon atoms and is selected from the group consisting of an allyl group, a vinyl group, an allylidene group, an allyloxy group, a crotonoyl group, a styryl group, a vinylidene group, a vinylene group, a diene group, a methylidene group, an acryloyl group, a methacryloyl group, an isopropenyl group, an ethynyl group, and a butenyl group and which imparts improved solubility, film formability and wettability to the dye.

4,987,022

NON-INFLAMMABLE LIGHT-WEIGHING TOUGH BOARD

Keisuke Ueno, No. 3010-17, Nogawa, Miyamae-ku, Kawasaki-shi, Kanagawa 213, Japan, assignor to Keisuke Ueno, Kanagawa; United Board Co., Ltd. and K. S. Consult Service Co., Inc., both of Tokyo, all of, Japan

Continuation of Ser. No. 170,883, Mar. 21, 1988, abandoned.
This application Jul. 31, 1989, Ser. No. 388,722
Int. Cl.[5] B32B *3/28;* D21H *11/00*
U.S. Cl. 428—182 **3 Claims**

1. A board structure, comprising:

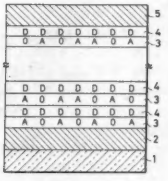
paper sheets including from 50% to 70% by weight phosphated wood pulp formed of wood pulp and phosphonic acid, and from 30% to 50% by weight of one of ceramic fiber and glass fiber, said paper sheets being corrugated; and, a toughening solution formed of an organic impregnating agent, said toughening solution being positioned on and impregnating said paper sheets.

4,987,023

ORGANIC THIN-FILM DEVICE

Itsuko Sato, Tokyo; Katsuyuki Naito, Yokohama; Nobuhiro Genma, Yokohama, and Makoto Azuma, Yokohama, all of Japan, assignors to Kabushiki Kaisha Toshiba, Kawasaki, Japan

Filed Mar. 29, 1989, Ser. No. 330,205
Claims priority, application Japan, Mar. 29, 1988, 63-73305; Oct. 11, 1988, 63-253742
Int. Cl.[5] B32B *7/04;* C09K *11/06;* G11C *11/00*
U.S. Cl. 428—215 **10 Claims**



1. An organic thin-film device for use in functional devices of display device, rectifiers, switching devices and light-memory devices, comprising:

a first organic thin-film including an acceptor molecule; and

a second organic thin-film including a donor molecule, stacked on the first organic thin-film, a dipole moment P_1 with a center being produced by charge transfer between the acceptor and donor molecules, at least one of the first and second organic thin-films including a chemical species having a dipole moment $\vec{P_2}$ with a center, and the dipole moment $\vec{P_2}$ and a dipole moment $\vec{P_1}$ produced by charge transfer between the acceptor and donor molecules satisfying the following formula:

$(\vec{P_1}\cdot\vec{P_2})|\vec{r}|^2-3(\vec{P_1}\cdot\vec{r})(\vec{P_2}\cdot\vec{r})<0$ wherein r represents a vector directing from the center of the dipole moment P_2 to the center of the dipole moment P_1, the chemical species including a structure represented by the formula A—M—D, wherein M is a conjugated hydrocarbon skeleton; A is an electron-attractive substituent of one of a nitro group, a cyano group, a carbonyl group and a sulfonyl group; and D is an electron-donative substituent of one of an amino group, an alkoxy group and a hydroxy group.

4,987,024

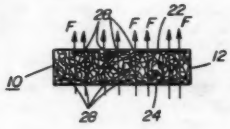
BATTERY SEPARATOR FABRIC AND RELATED METHOD OF MANUFACTURE

Ronald Greenberg, Worcester; Randy Rogers, Holliston, both of Mass.; Roland Bernier, Athens, and Stanley Littman, Rosell, both of Ga., assignors to International Paper Company, Purchase, N.Y.

Continuation-in-part of Ser. No. 867,856, Feb. 13, 1986, abandoned. This application Jan. 9, 1989, Ser. No. 294,859

Int. Cl.[5] D04H *1/04*

U.S. Cl. 428—219 14 Claims



1. A battery separator fabric for use in a battery comprising:

a nonwoven fibrous web of polyolefin fibers, having top and bottom surface fibers and inner fibers, the surfaces of said top and bottom surface fibers being seared by heat and pressure causing only the surfaces of said top and bottom surface fibers to spread out contacting other surface fibers so as to form top and bottom film-like surfaces on said web, the original state of said fibers being otherwise substantially unaffected by said heat or pressure;

said film-like surfaces having a plurality of pores disposed therein, said plurality of pores permitting ionic migration to occur in the battery by allowing electrolytes to pass through said pores;

said nonwoven fibrous web having a thickness prior to being seared of approximately 1–20 mils, such that the separator fabric has a thickness of approximately 2–3 mil, and percent void volume in the range of 28–45.

4,987,025

INFLATION FILM OF ULTRAHIGH MOLECULAR WEIGHT POLYETHYLENE

Takeshi Shiraki, Yamaguchi, and Koji Nakashima, Hiroshima, both of Japan, assignors to Mitsui Petrochemical Industries, Ltd., Tokyo, Japan

Continuation of Ser. No. 894,536, Aug. 8, 1986, abandoned. This application Jul. 19, 1988, Ser. No. 222,344

Claims priority, application Japan, Aug. 12, 1985, 60-175792; Jul. 21, 1986, 61-169699

Int. Cl.[5] C08F *10/02*

U.S. Cl. 428—220 3 Claims

1. An inflation film of ultra-high-molecular-weight polyethylene, consisting essentially of ultra-high-molecular-weight polyethylene and having an intrinsic viscosity of at least 8 dl/g, a tensile strength at break of 800 to 1660 kg/cm^2 in a machine direction and 700 to 1600 kg/cm^2 in a transverse direction, an impact strength of 5000 to 9500 kg cm/cm, a permeability to water vapor of less than 0.45 g mm/m^2 24 hr, a shrinkage factor in the transverse direction at 130° of 10% to 130%, and a thickness of 10 to 1000 μm.

4,987,026

FLAME RETARDANT FABRIC STRUCTURE

Martin I. Jacobs, Granger; Fredric L. Schrock, Mishawaka, both of Ind., and David P. Derse, Elm Grove, Wis., assignors to Uniroyal Plastics Co., Inc., Mishawaka, Ind.

Filed Aug. 31, 1988, Ser. No. 239,150

Int. Cl.[5] B32B *7/00*

U.S. Cl. 428—246 25 Claims

1. A coated fabric article comprising:

a single layer of fabric containing between about 10 and 90 weight percent of glass fiber and between 90 and 10 weight percent of a natural or synthetic fiber other than glass; said fabric having a weight of between about 1.5 and 5.5 ounces per square yard; and

a coating substantially completely covering one side of said fabric, said coating comprising a fire-retardant thermoplastic polyvinyl halide composition in a thickness of between about 10 and 60 mils to impart the desired drapability, tailorability and physical properties to the coated fabric; such that, when said coated fabric is placed under tension forces and exposed to fire, said glass fiber provides a structure which provides strength to said article and which does not tear apart due to said tension forces when said coating burns, thus providing a barrier to the penetration of flame through the article.

4,987,027

SUPPORT WEB FOR ROOF FOUNDATION WEBS

Karl-Christian Zerfass; Franz Kaulich, both of Bobingen; Michael Schöps, Grossaitingen; Hans Wagner, Bobingen, and Bertrand C. Weiter, Augsburg, all of Fed. Rep. of Germany, assignors to Hoechst Aktiengesellachaft, Frankfurt am Main, Fed. Rep. of Germany

Filed Sep. 12, 1989, Ser. No. 405,950

Claims priority, application Fed. Rep. of Germany, Sep. 14, 1988, 38312719

Int. Cl.[5] B32B *27/34*

U.S. Cl. 428—287 7 Claims

1. A support web for roof foundation webs which comprises a spunbonded web of polyester, in particular polyethylene terephthalate filaments, wherein the spunbonded web has a basis weight of 50 to 100 g/m^2 and a filament denier of 1 to 8 dtex and has been thermomechanically preconsolidated by means of a smooth calender and end-consolidated by means of a binder.

4,987,028

GLASS OR CERAMIC PLATE REINFORCED WITH FIBROUS OR FLAKY MATERIAL AND METHOD OF PRODUCING SAME

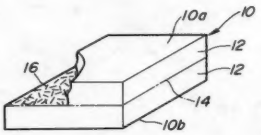
Takayoshi Kandachi, and Nobuo Nakamura, both of Osaka, Japan, assignors to Central Glass Company, Limited, Ube, Japan

Filed Oct. 25, 1988, Ser. No. 262,345

Claims priority, application Japan, Oct. 26, 1987, 62-268200

Int. Cl.[5] B32B *3/26, 5/24*

U.S. Cl. 428—312.6 9 Claims



1. A plate of a fired inorganic non-metallic material, comprising a thin reinforcement layer in which pieces of a ferritic chromium stainless steel wire are scattered over substantially the entire area of a laterally section of the plate, said reinforcement layer being parallel to two opposite surfaces of the plate and distant from said major surfaces, said steel wire pieces lying substantially parallel to said major surfaces and being two dimensionally randomly oriented, wherein the length of each of said pieces of wire is from 3 to 50 mm and the ratio of the length of each of said pieces to the diameter of the same piece is from 20 to 300.

4,987,029

MULTI-LAYER FILM ARRANGEMENT CAPABLE OF BEING DEEP-DRAWN

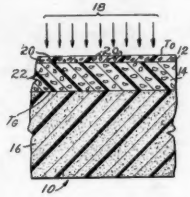
Werner Wagner, Bad Nenndorf; Axel Bruder, Burgwedel, and Kurt Giehsler, Hannover, all of Fed. Rep. of Germany, assignors to J. H. Benecke AG, Hannover, Fed. Rep. of Germany

Filed May 9, 1990, Ser. No. 520,230

Claims priority, application Fed. Rep. of Germany, May 10, 1989, 3915255

Int. Cl.[5] B32B *3/26*

U.S. Cl. 428—319.3 7 Claims



1. A multi-layer arrangement of films which is capable of being deep-drawn comprising at least an upper and lower film, which is backed by a foam layer, for the fabrication of molded objects wherein at least one layer (12, 14) contains particulate pigments which are added during the fabrication of the film and which have essentially no effect on the color of the upper layer (12).

4,987,030

HIGH-TENACITY CONJUGATED FIBER AND PROCESS FOR PREPARATION THEREOF

Isoo Saito; Takuji Sato, both of Okazaki; Koichi Kubota, Aichi, and Masaharu Yamamoto, Nagoya, all of Japan, assignors to Toray Industries, Inc., Tokyo, Japan

Filed Oct. 4, 1988, Ser. No. 253,135

Claims priority, application Japan, Oct. 7, 1987, 62-253125; Oct. 7, 1987, 62-253126

Int. Cl.[5] D02G *3/00*

U.S. Cl. 428—373 4 Claims

1. A high-tenacity conjugated fiber having a sheath-core conjugated structure consisting essentially of a polyester composed mainly of ethylene terephthalate units as the core component and a polyamide as the sheath component, wherein the ratio of the core component to the sum of the core component and sheath component is 30 to 90% by weight, and the conjugated fiber has (a) a hynamic elasticity (E'_{20}) at 20° C. of at least 8×10^4 dyne/denier and a dynamic elasticity (E'_{150}) at 150° C. of at least 3×10^4 dyne/denier, as measured at 110 Hz, and a main dispersion peak temperature ($T\alpha$) of at least 140° C. in the mechanical loss tangent (tan δ) curve, (b) a creep rate (CR_{20}) not larger than 2.0% as measured at 20° C. after 48 hours' standing under a load of 1 g/denier and a creep rate (CR_{150}) not larger than 3.0% as measured at 150° C. after 48 hours' standing under a load of 1 g/denier, (c) an intrinsic viscosity ([η]) of at least 0.8 and a birefringence (Δn) of 160×10^{-3} to 190×10^{-3} in the polyester core component, (d) a sulfuric acid relative viscosity (ηr) of at least 2.8 and a birefringence (Δn) of at least 50×10^{-3} in the polyamide sheath component, (e) a tenacity (T/D) of at least 7.5 g denier, (f) an initial modulus in tension (Mi) of at least 60 g/denier, and (g) a dry heat shrinkage (ΔS_{150}) as measured at 150° C. of not larger than 7%.

4,987,031

CAPSULE

Shinzo Tatematsu, 145-25, Kitanishi-cho, Nara 639-11 Yamatokoriyama-shi; Kazuki Omata, 6-22-6, Meguro-honcho, Meguro-ku,, Tokyo 152; Tatsuo Hashimoto, 77-12, Koizumi, Ageo-shi, Saitama 362; Masato Takahashi, 4-116-18, Miyahara-cho, Ohmiya-shi, Saitama 330, and Noriichi Ito, 2-3-28, Umamikita, Koryo-cho, Kitakatsuragi-gun Nara 635, all of Japan

PCT No. PCT/JP88/01011, § 371 Date Jun. 1, 1989, § 102(e) Date Jun. 1, 1989, PCT Pub. No. WO89/03206, PCT Pub. Date Apr. 20, 1989

PCT Filed Oct. 3, 1988, Ser. No. 362,430

Claims priority, application Japan, Oct. 6, 1987, 62-253111

Int. Cl.[5] A61K *9/48, 9/50;* B01J *13/02*

U.S. Cl. 428—402.2 1 Claim

1. A capsule the wall material of which consists essentially of 85–30% by weight of gelatin having a gelly strength of 250 bloom or greater, and 15–70% by weight of a polypeptide having a molecular weight of about 5,000–10,,000.

4,987,032

FUNCTIONAL ORGANIC THIN FILM AND METHOD OF MANUFACTURE THEREOF

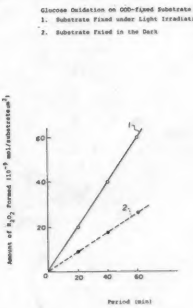
Tsutomu Miyasaka, and Koichi Koyama, both of Kanagawa, Japan, assignors to Fuji Photo Film Co., Ltd., Kanagawa, Japan

Filed Jun. 24, 1988, Ser. No. 210,941

Claims priority, application Japan, Jun. 26, 1987, 62-158994; Jun. 26, 1987, 62-158995

Int. Cl.[5] B32B *9/04;* B05D *3/06*

U.S. Cl. 428—411.1 9 Claims



1. A functional organic thin film formed of a monolayer or multilayers comprising amphiphilic organic molecules having a hydrophobic group containing at least 12 carbon atoms, in which at least one of the amphiphilic organic molecules is a precursor of a nitrene or carbene.

4,987,033

IMPACT RESISTANT CLAD COMPOSITE ARMOR AND METHOD FOR FORMING SUCH ARMOR

Stanley Abkowitz, Lexington; David M. Rowell, Billerica; Harold L. Heussi, Essex; Harold P. Ludwig, Woburn, and Stephen A. Kraus, Clinton, all of Mass., assignors to Dynamet Technology, Inc., Burlington, Mass.

Filed Dec. 20, 1988, Ser. No. 286,940

Int. Cl.[5] B32B *7/02*

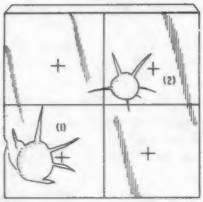
U.S. Cl. 428—469 16 Claims

1. A method for forming an impact resistant clad composite armor having a ceramic core, said method comprising the steps of:

surrounding said ceramic core with powder metal;

cold isostatically pressing the powder metal surrounding said ceramic core to a high initial density to form an armor compact; and

vacuum sintering said armor compact to further densify the powder metal and form said composite armor.



2. The method of claim 1, further comprising the step of:

hot isostatically pressing said armor to densify the powder metal to approximately 99% full density.

4,987,034

HIGH-EFFICIENCY METAL-MADE CARRIER BODY FOR EXHAUST GAS CLEANING CATALYST

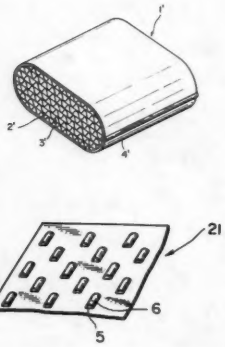
Yuzo Hitachi, Shizuoka, and Kazunori Takikawa, Numazu, both of Japan, assignors to Usui Kokusai Sangyo Kabushiki Kaisha, Japan

Continuation of Ser. No. 289,023, Dec. 23, 1988, abandoned. This application Apr. 4, 1990, Ser. No. 504,076

Claims priority, application Japan, Dec. 28, 1987, 62-197359

Int. Cl.[5] B01J *35/02;* **F01N** *3/24*

U.S. Cl. 428—593 **8 Claims**



1. In a metal carrier body for an exhaust gas cleaning catalyst, said carrier body comprising a multi-layered composite body formed by superimposing one over the other at least one planar metal band made of a thin metal sheet and at least one corrugated metal band made of another thin metal sheet and defining many network-patterned gas flow passages along a central axis thereof to allow an exhaust gas to axially flow as streams through the gas flow passages, the improvement wherein at least one of said bands includes a plurality of through-holes therein having raised portions around or adjacent said through-holes for creating turbulent flow of exhaust gas through said carrier body said through-holes and raised portions being arranged and dimensioned so as to preclude interlocking between adjacent metal bands thereby.

4,987,035

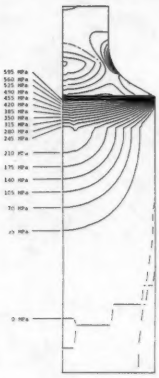
CERAMIC JOINTS

Bradley J. Miller, Worcester, and Donald O. Patten, Jr., Sterling, both of Mass., assignors to Norton Company, Worcester, Mass.

Continuation-in-part of Ser. No. 106,193, Oct. 7, 1987, abandoned. This application Feb. 27, 1989, Ser. No. 316,366

Int. Cl.[5] F16D *1/02*

U.S. Cl. 428—599 **25 Claims**



18. In an article of manufacture comprising a joint adhered over a fixed area between (a) a first material having (i) a first coefficient of thermal expansion (CTE), (ii) a first fracture toughness (K_c), (iii) a first modulus of rupture, and (iv) a first compressive strength that is greater than the first modulus of rupture, and (b) a second material having (i) a second CTE that is greater than the first CTE and (ii) a second K_c that is greater than the first K_c, the joint being intended for service at a temperature which is lower than the temperature at which the joint is formed, the improvement wherein (i) the first material is tapered sufficiently beginning at the joint interface (ii) the tapered surface of the first material is not bonded to the second material, and (iii) the first material is shaped in the part remote from the vicinity of the joint so that the maximum tensile stress predicted within any part of the first material by finite element analysis at the lower temperature does not exceed the modulus of rupture of the first material at the lower temperature.

4,987,036

MARINE ANTIFOULING

Keith E. J. Miller, Maidenhead, United Kingdom, assignor to Seamark Systems Limited, Edinburgh, Scotland

PCT No. PCT/GB89/00610, § 371 Date Feb. 12, 1990, § 102(e) Date Feb. 12, 1990, PCT Pub. No. WO89/12144, PCT Pub. Date Dec. 14, 1989

PCT Filed Jun. 2, 1989, Ser. No. 460,193

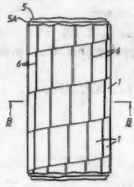
Claims priority, application United Kingdom, Jun. 2, 1988, 8813036

Int. Cl.[5] B32B *15/08, 31/26*

U.S. Cl. 428—626 **9 Claims**

1. An elongate marine antifouling composite material for application over a polychloroprene protective coating on a marine structure to provide an antifouling surface thereon, said composite material comprising a plurality of individual strips of copper or a copper-nickel alloy and at least one elongated support means, said strips being mounted on said elongated support means so as to be closely spaced, generally parallel with one another and oriented generally transversely of said elongated support means, said elongated support means allowing said strips to move closer to each other when the composite material is applied over an uncured polychloroprene coat-

ing on a marine structure and the coating is then cured, the composite material thereby providing a substantially continuous copper or copper-nickel alloy surface on the marine structure.



4,987,037

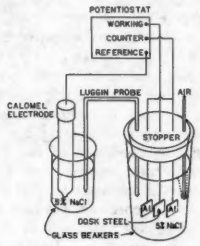
GALVANIC COATING WITH TERNARY ALLOYS CONTAINING ALUMINUM AND MAGNESIUM

Bryan E. Wilde, Granville, Ohio, and Michael K. Budinski, Pittsford, N.Y., assignors to The Ohio State University, Columbus, Ohio

Division of Ser. No. 75,591, Jul. 20, 1987, Pat. No. 4,826,657. This application Dec. 5, 1988, Ser. No. 279,500

Int. Cl.[5] C23F *2/12*

U.S. Cl. 428—653 **10 Claims**



1. A method of protecting steel, other than stainless steel, from corrosion, which method comprises:

(a) coupling galvanically the steel with an alloy which consists essentially of 2.5 to 4 percent by weight magnesium, 0.5 to 3.5 percent by weight of germanium, and a balance of aluminum.

4,987,038

FINE GOLD ARTICLES

Walter Holzer, Dristeweg 19, Meersburg, Fed. Rep. of Germany 7758

Filed Oct. 5, 1989, Ser. No. 417,631

Int. Cl.[5] B32B *15/01*

U.S. Cl. 428—672 **6 Claims**

1. A structurally strong, investment quality gold article of high troy weight, excellent color and visible structural properties, comprising:

a. a strengthened gold alloy structural base of at least 22 karat fineness gold and at least one other element added for strength;

b. a gold alloy coating of at least 22 karat fineness surrounding and affixed to all but one side of said structural base; and

c. relative proportions of said structural base and coating alloys being readily discernible by viewing an area containing an uncoated portion of said structural base.

4,987,039

MAGNETIC RECORDING MEDIUM

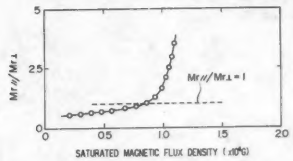
Hideo Daimon; Osamu Kitakami, both of Toride, and Hideo Fujiwara, Ibaraki, all of Japan, assignors to Hitachi, Ltd., Tokyo, Japan

Filed Mar. 30, 1988, Ser. No. 175,265

Claims priority, application Japan, Mar. 30, 1987, 62-77859; Feb. 8, 1988, 63-27004

Int. Cl.[5] G11B *23/00*

U.S. Cl. 428—694 **7 Claims**



1. A magnetic recording medium comprising a non-magnetic substrate and a magnetic membrane composed of Co and oxygen formed thereon thereby providing a membrane surface, which is characterized in that the saturated magnetic flux density of said magnetic membrane is in the range of 8,400 G to 12,600 G, the oxygen content of said membrane is in the range of 11 to 29 at %, and the residual magnetization in the in-plane direction of the membrane, Mr , and the residual magnetization in the perpendicular direction to the membrane surface, Mr1, have a relation satisfying Mr /Mr1 > 1 and the C-axis or Co being oriented in a perpendicular direction of the membrane surface.

4,987,040

MAGNETIC RECORDING MEDIUM FOR DISPLACEMENT DETECTORS

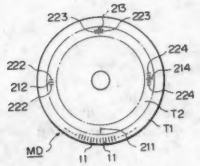
Kenzaburou Iijima; Yoshinori Hayashi, and Seiya Nishimura, all of Shizuoka, Japan, assignors to Yamaha Corporation, Japan

Filed Sep. 13, 1988, Ser. No. 243,680

Claims priority, application Japan, Sep. 16, 1987, 62-231702

Int. Cl.[5] G11B *7/00*

U.S. Cl. 428—694 **9 Claims**



1. An improved magnetic recording medium for displacement detectors said recording medium comprising

a first magnetized track including a number of juxtaposed magnetic graduations; and

a second magnetized track having a plurality of magnetic standard marks spaced from each other at constant intervals and magnetic identification marks in said second track which uniquely identify said standard marks and discriminate said standard marks from one another.

4,987,041

SEALED NICKEL-CADMIUM BATTERY

Gerhard Simon, Kelkheim, Fed. Rep. of Germany, assignor to Varta Batterie Aktiengesellschaft, Hanover, Fed. Rep. of Germany

Continuation of Ser. No. 771,939, Sep. 3, 1985, abandoned. This application Dec. 21, 1989, Ser. No. 455,806

Claims priority, application Fed. Rep. of Germany, Sep. 13, 1984, 3433544

Int. Cl.[5] H01M *4/36, 10/52*

U.S. Cl. 429—59 4 Claims

1. A gas-tight, sealed nickel-cadmium storage battery comprising porous positive and negative electrodes and porous separators disposed between the porous electrodes, wherein surface portions of the negative electrodes are coated with an active carbon-containing material for catalytic oxygen recombination in an amount of from 0.2 to 0.8 g/dm^2 such that said surface portions form islands of said carbon-containing material and islands of exposed cadmium or cadmium hydroxide, in a random distribution.

4,987,042

POLYTHIOPHENES, PROCESS FOR THEIR PREPARATION AND THEIR USE

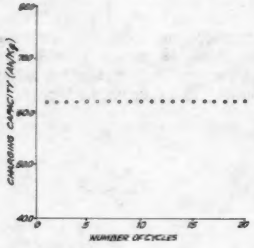
Friedrich Jonas, Aachen; Gerhard Heywang, Bergisch Gladbach; Werner Schmidtberg, Leverkusen; Jürgen Heinze, and Michael Dietrich, both of Freiburg, all of Fed. Rep. of Germany, assignors to Bayer Aktiengesellschaft, Leverkusen, Fed. Rep. of Germany

Division of Ser. No. 337,498, Apr. 13, 1989. This application Apr. 12, 1990, Ser. No. 508,738

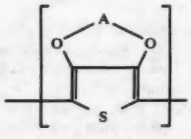
Claims priority, application Fed. Rep. of Germany, Apr. 22, 1988, 3813589; Dec. 23, 1988, 3843412

Int. Cl.[5] H01M *4/60*

U.S. Cl. 429—213 1 Claim



1. A rechargeable battery one electrode of which comprises a polythiophene containing structural units of the formula



(I)

in which A is an C_1–C_4-alkylene radical or a substituted C_1–C_4-alkylene radical.

4,987,043

METHOD FOR THE PRODUCTION OF A MULTICOLOR FILTER ARRAY

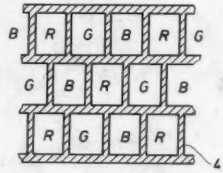
Raymond A. Roosen, 's-Gravenwezel; Marcellus H. De Meyer, Edegem, and Wilhelmus Janssens, Aarschot, all of Belgium, assignors to Agfa-Gevaert, N.V., Mortsel, Belgium

Filed May 2, 1989, Ser. No. 346,408

Claims priority, application European Pat. Off., May 10, 1988, 88200920

Int. Cl.[5] G03C *7/12*

U.S. Cl. 430—7 12 Claims



1. A method for the production of a multicolour filter array or mosaic wherein individual colour pixels are delineated by a light absorbing contour pattern, which method comprises the steps of:

(1) providing a photosensitive dye receptor material being a photographic silver halide emulsion material incorporating at least one waterpermeable silver halide emulsion layer on a support,

(2) depositing pixelwise different dyes or dye precursor compounds onto said photosensitive dye receptor material,

(3) photo-exposing said at least one silver halide emulsion layer of said photosensitive dye receptor material to a light pattern resulting in a latent image in the form of a contour line pattern delineating the individual colour pixels obtained by deposition of said dyes on said photosensitive dye receptor material, and

(4) developing said latent image to form in said dye receptor material an image representing a light-absorbing contour line pattern delineating the individual colour pixels obtained by deposition of said dyes in said dye receptor material.

4,987,044

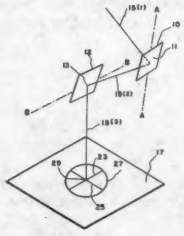
METHOD AND APPARATUS FOR MAINTAINING DESIRED EXPOSURE LEVELS

Eustathios Vassiliou, Newark, Del., assignor to E. I. du Pont de Nemours and Company, Wilmington, Del.

Filed May 31, 1989, Ser. No. 359,806

Int. Cl.[5] G03G *13/04;* G03C *5/04*

U.S. Cl. 430—20 15 Claims



1. A method for subjecting predetermined portions of a

surface to desired exposure levels with a beam of radiation, comprising the steps of:

deflecting said beam towards said surface through a set of a first mirror and a second mirror, the first mirror having a first rotational axis, the second mirror having a second rotational axis;

oscillating said first mirror about said first axis at a desired frequency and effective amplitude with a substantially sinusoidal motion, and oscillating said second mirror about said second axis with a substantially sinusoidal motion at substantially said desired frequency and effective amplitude as employed for said first mirror, so that both mirrors are characterized by a common frequency value and a common effective amplitude value;

maintaining a substantially 90 degree phase difference between the sinusoidal motion of the first mirror and the sinusoidal motion of the second mirror;

tracing said surface with said beam in a spiral path by changing gradually and simultaneously the common value of the effective amplitude and the common value of the frequency inversely, so that the product of the two values is controlled so as to yield a desired exposure level on the traced surface when the beam is on; and

turning the beam off and on at predetermined angular positions in order to subject said predetermined portions of said surface located within the prearranged positions to a desired exposure level.

9. The method of claim 1, wherein the surface comprises a liquid crystal constituent.

4,987,045

PHOTOSENSITIVE MEMBER FOR ELECTROPHOTOGRAPHY

Tetsumi Suzuki, Isehara; Tetsuo Murayama, Machida; Hitoshi Ono, Yokohama, and Osamu Ando, Kawasaki, all of Japan, assignors to Mitsubishi Kasei Corporation, Tokyo, Japan

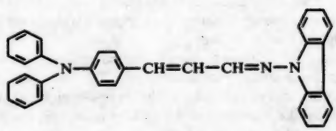
Continuation of Ser. No. 307,159, Feb. 6, 1989, abandoned, which is a continuation of Ser. No. 111,913, Oct. 21, 1987, abandoned, which is a continuation of Ser. No. 920,507, Oct. 17, 1986, abandoned. This application Oct. 11, 1989, Ser. No. 420,684

Claims priority, application Japan, Oct. 23, 1985, 60-236935

Int. Cl.[5] G03G *5/14*

U.S. Cl. 430—59 **6 Claims**

1. A photosensitive member for electrophotography having a photosensitive layer composed of (a) a charge carrier transport layer comprising a hydrazone compound represented by the formula (I):



(I)

and a binder, and (b) a charge carrier generating layer comprising an azo pigment with or without a binder.

4,987,046

ELECTROPHOTOGRAPHIC PHOTOCONDUCTOR AND METHOD FOR THE PREPARATION THEREOF

Atsushi Kutami, and Yoshikazu Kaneko, both of Numazu, Japan, assignors to Ricoh Company, Ltd., Tokyo, Japan

Filed Mar. 14, 1989, Ser. No. 323,403

Claims priority, application Japan, Mar. 14, 1988, 63-61376; May 30, 1988, 63-134002

Int. Cl.[5] G03G *15/00*; G03C *1/74*

U.S. Cl. 430—127 **37 Claims**

1. A method for producing an electrophotographic photoconductor, comprising the steps of:

forming a metallic sheet in the form of a tube having a seam;

welding the seam of said tube by resistance welding to form an electroseamed tube; and

coating a photoconductive layer on said electroseamed tube.

4,987,047

IMAGING SHEET ROLL CONTAINING PHOTOSENSITIVE MICROCAPSULES

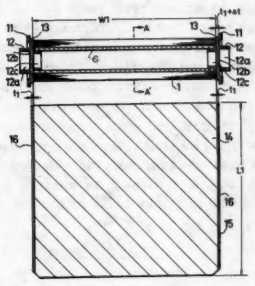
Yasuji Yui, Kanagawa, and Akira Shirakura, Tokyo, both of Japan, assignors to Sony Corporation, Tokyo, Japan

Filed Jan. 10, 1989, Ser. No. 295,384

Claims priority, application Japan, Jan. 29, 1988, 63-10681[U]

Int. Cl.[5] G03C *1/72, 3/02*

U.S. Cl. 430—138 **7 Claims**



1. An imaging sheet roll comprising:

a photosensitive film of a predetermined width and having a coating of photosensitive microcapsules;

a spool for winding therearound said photosensitive film in the form of a roll;

flange portions extending radially outward at the opposite ends of said spool with an axial distance between confronting surfaces of said flange portions being as large as said width of the film for guiding the latter in said roll on the spool;

a leader tape portion of a material which is impervious to the passage of light therethrough and is bonded to said photosensitive film at its end portion at which said photosensitive film begins to be unwound from said roll thereof on said spool, said leader tape portion having a width larger than said axial distance between said confronting surfaces of the flange portions; and said leader tape portion being coated with an adhesive bonding agent on its opposite side edges

annular step portions formed on radially outer regions of said flange portions and extending axially away from each

other relative to said confronting surfaces so that lateral edge portions of said leader tape portion of said photosensitive film are wound on said annular step portions for shielding said roll of the photosenstive film from light.

4,987,048

IMAGE FORMING MATERIAL

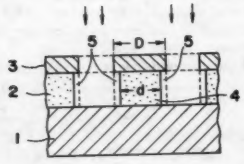
Fumiaki Shinozaki, and Tomizo Namiki, both of Shizuoka, Japan, assignors to Fuji Photo Film Co., Ltd., Kanagawa, Japan

Continuation of Ser. No. 64,429, Jun. 22, 1987, abandoned. This application Aug. 7, 1989, Ser. No. 393,069

Claims priority, application Japan, Jun. 23, 1986, 61-146580

Int. Cl.[5] G03F *7/23, 7/33, 7/105*

U.S. Cl. 430—166 **5 Claims**



1. An image forming material comprising a support, a coloring material layer consisting essentially of an organic high-molecular polymer and a coloring material, and a photosensitive resin layer consisting essentially of a photosensitive film-forming substance in order in the form of a laminate, wherein after exposure to actinic rays, the exposed portion of said photosensitive resin layer has a solubility in an alkaline developing solution different from that of the unexposed portions, wherein said coloring material layer shows substantially no side etching upon image-wise exposure and development, and wherein the high-molecular polymer consists essentially of a copolymer of at least one ester monomer selected from the group consisting of an aralkyl acrylate and an aralkyl methacrylate and at least one acid monomer selected from the group consisting of acrylic acid and methacrylic acid, said ester monomer and acid monomer being in a molar ratio of 75:25 to 40:60.

4,987,049

IMAGE-RECEIVING ELEMENT FOR HEAT TRANSFER TYPE DYE IMAGE

Tawara Komamura; Nobuyuki Takiyama, and Katsunori Katoh, all of Hino, Japan, assignors to Konica Corporation, Tokyo, Japan

Filed Jul. 13, 1990, Ser. No. 553,781

Claims priority, application Japan, Jul. 21, 1989, 64-189668; Sep. 19, 1989, 64-244539

Int. Cl.[5] G03C *5/54*

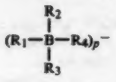
U.S. Cl. 430—203 **18 Claims**

1. An image-receiving element for heat transfer type dye image, which comprises a support, a binder and a compound represented by the formula (I) shown below on the support:

Formula (I):

$$[M(X_1)_h(X_2)m(X_3)n]^{p+}Q$$

wherein, M represents a transition metal ion, X_1, X_2 and X_3 represent a coordination compound capable of forming a complex by coordinate bonding with the transition metal ion Q represents



or $(R_5—SO_3^-)_d$, R_1,R_2, R_3 and R_4 each represent an alkyl group, an aryl group, a cyano group, a heterocyclic residual group or hydrogen atom (these may be the same or different), R_5 represents an alkyl group or an aryl group, λ represents 1, 2 or 3, m represents 1, 2 or 0, n represents 1 or 0, and p represents 1 or 2.

4,987,050

LIGHT-SENSITIVE TRANSFER MATERIAL AND IMAGE-FORMING PROCESS USING THE SAME

Fumiaki Shinozaki, and Shunzo Yagami, both of Shizuoka, Japan, assignors to Fuji Photo Film Co., Ltd., Kanagawa, Japan

Filed Dec. 5, 1989, Ser. No. 446,362

Claims priority, application Japan, Dec. 6, 1988, 63-308629

Int. Cl.[5] G03C *3/00*

U.S. Cl. 430—252 **3 Claims**

1. A light-sensitive transfer material comprising a substantially transparent support having provided on one side thereof, in order from the support, a stripping layer, and a lamination of a colorant layer containing a dye or a pigment and a photoresist layer or a photoresist layer containing a dye or a pigment, and having provided on the other side thereof a physical development nuclei-containing layer adapted for diffusion transfer processing using a silver halide emulsion.

4,987,051

IMAGE-REVERSAL PROCESS USING PHOTOSENSITIVE PEEL-APART ELEMENTS

Harvey W. Taylor, Jr., Sayre, Pa., assignor to E. I. Du Pont de Nemours and Company, Wilmington, Del.

Filed Aug. 9, 1989, Ser. No. 391,785

Int. Cl.[5] G03C *3/00, 11/12, 1/805*

U.S. Cl. 430—253 **17 Claims**

1. A process for preparing a precolored image useful in an overlay proof, said process comprising, in the stated order, the following steps:

(A) providing a precolored, peel-apart photosensitive element comprising, in order from top to bottom:

(1) a strippable coversheet which is transparent to actinic radiation,

(2) a photohardenable layer comprising a colorant;

(3) an essentially non-photosensitive elastomeric layer; and

(4) a support sheet;

and wherein the adhesive relationship of the photohardenable layer (2) relative to the coversheet (1) and to the elastomeric layer (3) is altered by exposure to actinic radiation, so that in the unexposed element the photohardenable layer adheres more strongly to the elastomeric layer than to the coversheet, whereas after exposure to actinic radiation, the photohardenable layer adheres more strongly to the coversheet than to the elastomeric layer;

(B) peeling off the coversheet;

(C) exposing the element, minus the coversheet, to actinic radiation in an imagewise manner;

(D) laminating the coversheet to the exposed element so that the side of the coversheet originally in contact with the photohardenable layer is again in contact with the photohardenable layer;

(E) exposing the element overall to actinic radiation; and

(F) peeling off the coversheet, whereby the areas of the photohardenable layer exposed in step (C) remain on the elastomeric layer and the areas of the photohardenable layer not exposed in step (C) remain on the coversheet.

10. A process for preparing a precolored image useful in a

pre-press surprint color proof, said process comprising, in the stated order, the following steps:

(A) providing a precolored, peel-apart photosenstive element comprising, in order from top to bottom:

(1) a strippable coversheet which is transparent to actinic radiation,

(2) a photohardenable layer comprising a colorant;

(3) an essentially non-photosensitive elastomeric layer; and

(4) a removable support sheet;

and wherein the adhesive relationship of the photohardenable layer (2) relative to the coversheet (1) and to the elastomeric layer (3) is altered by exposure to actinic radiation, so that in the unexposed element the photohardenable layer adheres more strongly to the elastomeric layer than to the coversheet, whereas after exposure to actinic radiation, the photohardenable layer adheres more strongly to the coversheet than to the elastomeric layer;

(B) removing the removable support sheet and adhering the element, minus the removable support, to a receptor sheet (5);

(C) peeling off the coversheet;

(D) exposing the element, comprising the photohardenable layer (2), the elastomeric layer (3), and the receptor (5), to actinic radiation in an imagewise manner;

(E) laminating the coversheet to the photohardenable layer of the exposed element so that the side of the coversheet originally in contact with the photohardenable layer is again in contact with the photohardenable layer;

(F) exposing the element overall to actinic radiation; and

(G) peeling the strippable coversheet from the photohardenable layer, whereby the material in the areas of the photohardenable layer imagewise exposed in step (D) remain on the elastomeric layer, and the material in the areas of the photohardenable layer not exposed in step (D) remain on the coversheet.

4,987,052

SILVER HALIDE PHOTOGRAPHIC MATERIAL AND METHOD FOR FORMING SUPERHIGH CONTRAST NEGATIVE IMAGES USING THE SAME

Shigeo Hirano; Kazunobu Katoh; Yoshio Inagaki, and Nobuaki Inoue, all of Kanagawa, Japan, assignors to Fuji Photo Film Co., Ltd., Kanagawa, Japan

Continuation-in-part of Ser. No. 37,283, Apr. 8, 1987, abandoned. This application Dec. 29, 1987, Ser. No. 139,230

Claims priority, application Japan, Apr. 8, 1986, 61-80640; May 30, 1986, 61-124830; May 30, 1986, 61-124831

Int. Cl.[5] G03C *1/16, 1/42*

U.S. Cl. 430—264 **28 Claims**

7. A method for forming a superhigh contrast negative image comprising developing an imagewise exposed silver halide photographic material with a developing solution containing sulfite ions in an amount of at least about 0.15 mol per liter and having a pH of about 10.5 to about 12.3, wherein said silver halide photographic material comprises at least one silver halide emulsion layer on a support, at least one of said silver halide emulsion layer and other constituting layers of said material containing at least one hydrazine derivative and at least one of said silver halide emulsion layer and said other constituting layers containing at least one compound having both a silver halide adsorbing group and an acid group represented by the general formula (I):

C-L-D (I)

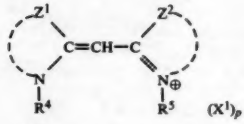
wherein

C represents a group that enhances adsorption to silver halide,

D represents an acid group, and

L represents a divalent linking group,

said compound possessing substantially no absorption maximum in the visible region, wherein at least said silver halide emulsion layer contains said at least one compound represented by said general formula (I) and also contains a cyanine dye or a merocyanine dye having an absorption maximum in the visible region, whereby said silver halide emulsion layer containing said at least one compound represented by said general formula (I) is spectrally sensitized, and wherein said compound of general formula (I) is selected from compounds represented by formula (I')



(I')

wherein

Z^1 and Z^2, which may be the same or different, each represents a group of non-metallic atoms required to complete a benzoxazole nucleus, a benzothiazole nucleus, a benzoselenazole nucleus, a naphthoxazole nucleus, a napthothiazole nucleus, a naphthoselenazole nucleus, a thiazole nucleus, a thiazoline nucleus, an oxazole nucleus, a selenazole nucleus, a selenazoline nucleus, a pyridine nucleus or a quinoline nucleus,

R^4 and R^5, which may be the same or different, each represents an alkyl group,

X^1 represents an electric charge balancing counter ion, and

p is 0 or 1.

4,987,053

POLYMERIZABLE COMPOUNDS, AND A RADIATION-POLYMERIZABLE MIXTURE CONTAINING SAME

Joachim Gersdorf, and Klaus Rose, both of Wiesbaden, Fed. Rep. of Germany, assignors to Hoechst Aktiengesellschaft, Frankfurt am Main, Fed. Rep. of Germany

Filed Nov. 14, 1988, Ser. No. 270,351

Claims priority, application Fed. Rep. of Germany, Nov. 16, 1987, 3738864

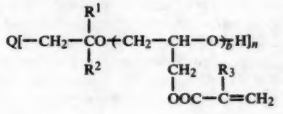
Int. Cl.[5] G03C *7/028, 7/09;* C08F *2/48;* C08J *3/28*

U.S. Cl. 430—277 **11 Claims**

1. A radiation-polymerizable composition comprising

(a) a polymeric binder,

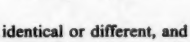
(b) a polymerizable compound of the formula



(I)

in which

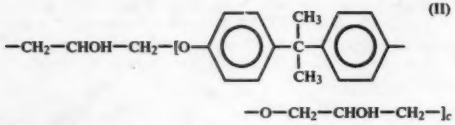
Q denotes



R^1 and R^2 are identical or different, and each denote a hydrogen atom, an alkyl group or an alkoxyalkyl group,

R^3 denotes a hydrogen atom, a methyl group or an ethyl group,

E denotes a saturated hydrocarbon group having 2 to 12 carbon atoms, a cycloaliphatic group having 5 to 7 ring members and which comprises zero to two N, O or S atoms as ring members, an arylene group having 6 to 12 carbon atoms, a heterocyclic aromatic group having 5 or 6 ring members or a group of the formula II



(II)

b denotes an integer from 1 to 4,

c denotes an integer from 1 to 3, and

n denotes 3 or 4, depending on the valency of Q, where all radicals of the same definition may be identical to or different from one another, and

(c) at least one compound capable of initiating polymerization of compound (b) under the action of actinic radiation.

8. A radiation-polymerizable recording material which comprises a support and a radiation-polymerizable layer comprising a composition as claimed in claim 1.

9. A radiation-polymerizable recording material as claimed in claim 8, wherein said support has a surface comprising aluminum or copper.

4,987,054

PHOTOPOLYMERIZABLE COMPOSITIONS WITH BINDERS CONTAINING CARBOXYL GROUPS

Manfred Sondergeld, Muhlheim/Main, and Jonathan W. Goodin, Neu-Isenburg, both of Fed. Rep. of Germany, assignors to E. I. Du Pont de Nemours and Company, Wilmington, Del.

Filed Mar. 1, 1989, Ser. No. 318,148

Claims priority, application Fed. Rep. of Germany, Apr. 29, 1988, 3814567

Int. Cl.[5] G03C *1/77*; G03F *7/037*

U.S. Cl. 430—275 **8 Claims**

1. A photopolymerizable composition for image recording comprising

(a) at least one addition-polymerizable, ethylenically unsaturated compound,

(b) a photoinitiator or a photoinitiator system and

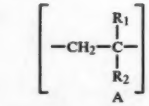
(c) at least one copolymeric binder containing one or more structural units A and B and at least one additional structural unit C1 or C2 containing carboxyl groups, characterized in that

(I) 5 to 50 percent by weight of the copolymer is formed from one or more different structural units C1, C2 or combinations thereof containing carboxyl groups

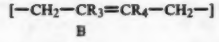
(II) the proportion of one or more different structural units A is 5 to 95 percent by weight,

(III) the proportion of one or more different structural units B is 0 to 50 percent by weight and

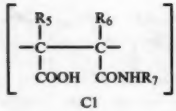
(IV) A, B, C1 and C2 have the structures



A

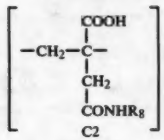


B



C1

-continued



in which

R_1=H, CH_3, C_2H_5, phenyl and alkylphenyl,

R_2=H, CH_3, phenyl, —$COOR_9$, —$CONR_{10}R_{11}$ and —CN,

R_3, R_4, R_5, and R_6=H and alkyl and

R_7, R_8, R_9, R_{10} and R_{11}=H, alkyl and aryl, which is unsubstituted or substituted with one or more hydroxy, ester, halogen, keto, ether or thioether groups.

8. A photopolymerizable composition in accordance with claim 1 characterized in the form of a solid layer on a metallic support or a metal-clad support.

4,987,055

PHOTOPOLYMERIZABLE COMPOSITION COMPRISING (METH)ACRYLATES WITH PHOTOOXIDIZABLE GROUPS, AND A RECORDING MATERIAL PRODUCED THEREFROM

Klaus Rode, Wiesbaden; Dieter Mohr, Budenheim; Werner Frass, Wiesbaden-Naurod, and Joachim Gersdorf, Wiesbaden, all of Fed. Rep. of Germany, assignors to Hoechst Aktiengesellschaft, Frankfurt am Main, Fed. Rep. of Germany

Filed Dec. 21, 1988, Ser. No. 287,276

Claims priority, application Fed. Rep. of Germany, Dec. 22, 1987, 3743547

The portion of the term of this patent subsequent to Jan. 8, 2008, has been disclaimed.

Int. Cl.[5] G03F *7/032*

U.S. Cl. 430—277 **29 Claims**

1. A photopolymerizable composition comprising:

(a) a polymeric binder,

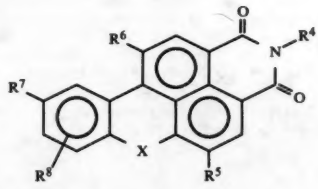
(b) an acrylate or alkacrylate of a polyhydric alcohol, said acrylate or alkacrylate comprising at least one group which is photooxidizable on exposure to actinic radiation in the presence of a photoreducible dye,

(c) a photoinitiator comprising a photoreducible benzoxanthene or benzothioxanthene dye,

(d) a second photoinitiator comprising a trihalomethyl compound capable of being cleaved by irradiation,

and optionally (e) an acridine, phenazine, or quinoxaline compound which acts as a photoinitiator.

13. A composition as claimed in claim 1, wherein said benzoxanthene dye or benzothioxanthene dye is a compound of the formula IV b



(IVb)

in which

R^4 denotes a substituted or unsubstituted alkyl, hydroxylalkyl, dialkylaminoalkyl or aryl radical,

R^5 and R^6 denote hydrogen atoms, halogen atoms or substituted or unsubstituted alkxoy radicals,

R^7 and R^8 denote hydrogen atoms, halogen atoms or nitrile, alkyl, alkoxy, aryl or alkoxycarbonyl radicals, and

X denotes an oxygen or sulfer atom.

14. A composition as claimed in claim **1** comprising from about 10 to 80% by weight of said acrylate or alkacrylate.

24. A photopolymerizable recording material comprising a layer support and a photopolymerizable layer, wherein said photopolymerizable layer comprises a composition as claimed in claim **1**.

26. A photopolymerizable recording material as claimed in claim **24**, wherein said support has a surface comprising aluminum, steel, zinc or copper.

4,987,056

PHOTOPOLYMERIZABLE COMPOSITION

Satoshi Imahashi; Atsushi Saito, and Katuhiro Yamashita, all of Shiga, Japan, assignors to Toyo Boseki Kabushiki Kaisha, Osaka, Japan

Filed Jun. 2, 1989, Ser. No. 360,831

Claims priority, application Japan, Jun. 2, 1988, 63-136272; Oct. 22, 1988, 63-266654; Dec. 10, 1988, 63-312748

Int. Cl.[5] **G03F** *7/029;* **C08F** *4/10, 4/16, 4/26*

U.S. Cl. 430—281 **5 Claims**

1. A photopolymerizable composition which

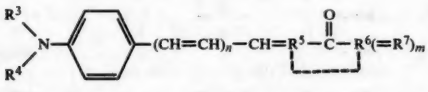
(a) at least one ethylenic unsaturated compound which is non-gaseous at room temperature;

(b) at least one metallic arene compound of the general formula (I):

$$[R^1(R^2M)]^{m+}Y^{n-} \quad (I)$$

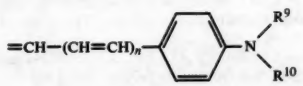
wherein m and n are an integer of 1 or 2, R^1 is π-arene, R^2 is π-arene or an anion of π-arene, M is a monovalent to trivalent metallic cation of the IVb to VIIb group, VIII group or Ib group of the periodic table, and Y is an anion selected from the group consisting of BF_4^-, PF_6^-, AsF_6^-, SbF_6^-, $FeCl_4^-$, $SnCl_6^-$, $SbCl_6^-$ and $BiCl_6^-$; and

(c) at least one compound selected from the group consisting of a p aminophenyl unsaturated ketone compound of the general formula (II):

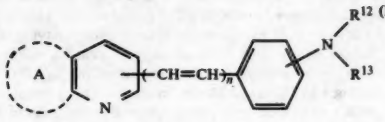


(II)

wherein m and n are 0 or 1, R^3 and R^4 are a hydrogen atom or an alkyl group having 1 to 6 carbon atoms, or CH_2COOR^8 in which R^8 is a hydrogen atom or an alkyl group having 1 to 6 carbon atoms, an alkaline metal, ammonium or an amine, or $C_2H_4CF_3$, C_2H_4I, C_2H_4Br, C_2H_4Cl, C_2H_4F, C_2H_4CN or $C_2H_4NO_2$, R^5 is methylidine or an alkylene-iridin group having 1 to 6 carbon atoms which can combine with R^6 and form a ring together with the carbonyl group, R^6 is carbon atom, a phenyl group optionally substituted by an amino, N-alkylamino having to 6 carbon atoms, N,N-dialkylamino having 1 to 6 carbon atoms, hydroxy, alkoxy having 1 to 6 carbon atoms, alkylthio having 1 to 6 carbon atoms, aryl hydrocarbon having 6 to 14 carbon atoms or mercapto, or a group which forms indanone or tetralone together with R^5 and the carbonyl group, and R^7 is:

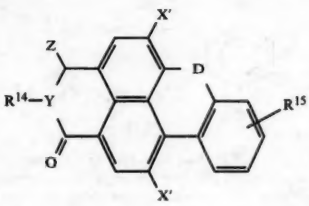


wherein n is 0 or 1, R^9 and R^{10} are a hydrogen atom or an alkyl group having 1 to 6 carbon atoms or CH_2COOR^{11} wherein R^{11} is a hydrogen atom, an alkyl group having 1 to 6 carbon atoms, an alkaline metal, ammonium, or an amine, or $C_2H_4CF_3$, C_2H_4I, C_2H_4Br, C_2H_4Cl, C_2H_4F, C_2H_4CN or $C_2H_4NO_2$, a pyridine derivative of the general formula (III):



(III)

wherein, n is 1 or 2, R^{12} and R^{13} are an alkyl group having 1to 6 carbon atoms and A is an optionally aryl present group which can be condensed to the pyridine ring to form aquinoline ring, or a salt thereof, and a xanthene or thioxanthene compound of the general formula (IV):



(IV)

wherein D is an oxygen atom or a sulfur atom, X' is a hydrogen atom or a halogen atom, Y is a carbon atom or a nitrogen atom, provided that, when Y is a carbon atom, Y is bonded to the adjacent carbon atom through a double bonding indicated by a dotted line in formula (IV), and, when Y is a nitrogen atom, Y is bonded to the adjacent carbon atom through a single bond, Z is an oxygen atom which is bonded to the adjacent carbon atom through a double bond, an alkoxy group having 1 to 6 carbon atoms or an alkanoyloxy group having 1 to 6 carbon atoms, R^{14} is an alkyl group having 1 to 6 carbon atoms, a hydroxyalkyl group having 1 to 6 carbon atoms, an alkoxyalkyl group having 2 to 12 carbon atoms, a dialkylaminoalkyl group having 3 to 18 carbon atoms, or an aryl hydrocarbon group of 6 to 14 oarbon atoms optionally substituted with alkyl groups of 1 to 4 carbon atoms, and R^{15} is a hydrogen atom, an alkoxy group having 1 to 6 carbon atoms, an alkyl group having 1 to 6 carbon atoms or a dialkylamino group having 1 to 6 carbon atoms.

4,987,057

PHOTOINITIATOR AND PHOTOPOLYMERIZABLE COMPOSITION USING THE SAME

Makoto Kaji, Fargo, N. Dak., and Nobuyuki Hayashi, Hitachi, Japan, assignors to Hitachi Chemical Co., Ltd., Tokyo, Japan

Continuation-in-part of Ser. No. 203,455, Jun. 7, 1988, abandoned. This application May 22, 1989, Ser. No. 355,123

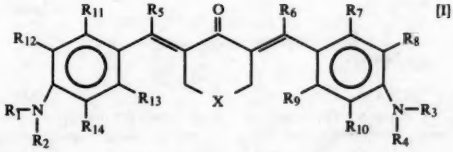
Claims priority, application Japan, Jun. 8, 1987, 62-142914

Int. Cl.[5] **G03C** *1/70*

U.S. Cl. 430—281 **7 Claims**

1. A photoinitiator composition comprising

(1) an aminobenzylidene carbonyl compound represented by the formula:

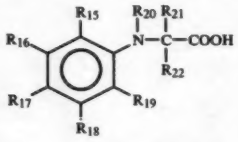


[I]

wherein R_1, R_2, R_3 and R_4 are independently an alkyl group having 1 to 6 carbon atoms; R_5 and R_6 are independently a hydrogen atom, a cyano group, an alkoxycarbonyl group having 2 to 8 carbon atoms, an alkyl group having 1 to 12

carbon atoms or an aryl group; R_7, R_8, R_9, R_{10}, R_{11}, R_{12}, R_{13} and R_{14} are independently a hydrogen atom, a chlorine atom, a bromine atom, an alkyl group having 1 to 12 carbon atoms, an aryl group or an alkoxy group having 1 to 12 carbon atoms; and X is an oxygen atom, a sulfur atom, —NH— or nitrogen atom substituted by an alkyl group having 1 to 12 carbon atoms, an aralkyl group having 1 to 12 carbon atoms, an aryl group, an acyl group having 1 to 12 carbon atoms, an alkoxycarbonyl group having 1 to 12 carbon atoms, an arylcarbonyl group having 7 to 20 carbon atoms, or an aryloxycarbonyl group having 7 to 20 carbon atoms, and

(2) an N-aryl-α-amino acid represented by the formula:



[II]

wherein R_{15}, R_{16}, R_{17}, R_{18} and R_{19} are independently a hydrogen atom, an alkyl group having 1 to 12 carbon atoms or a halogen atom; R_{20} is a hydrogen atom, an alkyl group having 1 to 12 carbon atoms, a cycloalkyl group, a hydroxyalkyl group having 1 to 12 carbon atoms, an alkoxyalkyl group having 1 to 12 carbon atoms, an aminoalkyl group having 1 to 12 carbon atoms or an aryl group; and R_{21} and R_{22} are independently a hydrogen atom or an alkyl group having 1 to 8 carbon atoms.

4,987,058

PHOTOGRAPHIC PROCESSING METHOD

Erika Spriewald; Gustav Tappe, both of Leverkusen, and Heinz Meckl, Bergisch Gladbach, all of Fed. Rep. of Germany, assignors to Agfa-Gevaert Aktiengesellschaft, Leverkusen, Fed. Rep. of Germany

Filed Jun. 13, 1990, Ser. No. 537,942

Claims priority, application Fed. Rep. of Germany, Jun. 27, 1989, 3920922

Int. Cl.[5] G03C *7/00, 7/42, 5/38*

U.S. Cl. 430—372 **2 Claims**

1. Wash-free method for preparing colour photographs by developing, bleach-fixing, stabilising and drying, characterised in that the bleach-fixing bath contains a compound of the formula $Fe(X)_2DTPA$, wherein X denotes alkali or ammonium, as bleaching agent, and the stabilising bath contains a fungicide, 1-hydroxyethane-1, 1-diphosphonic acid and a hexametaphosphate.

4,987,059

PROCESS FOR STABILIZING PHOTOGRAPHIC SILVER IMAGES

Werner Berthold; Helmut Häseler; Paul Marx, all of Leverkusen; Heinz Meckl, and Hans Öhischläger, both of Bergisch Gladbach, all of Fed. Rep. of Germany, assignors to AGFA-Gevaert Aktiengesellschaft, Leverkusen, Fed. Rep. of Germany

Filed Nov. 17, 1989, Ser. No. 438,743

Claims priority, application Fed. Rep. of Germany, Dec. 1, 1988, 3840489

Int. Cl.[5] G03C *5/24*

U.S. Cl. 430—428 **7 Claims**

1. A process for stabilizing a silver image produced by exposure, development and fixing of a photographic material containing at least one silver halide emulsion layer, characterized in that, immediately after fixing and in the absence of washing the photographic material is subjected to treatment by a stabilizing bath containing a compound corresponding to general formula (I)

in which

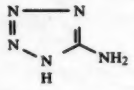
X=Cl, Br

R^1=H, C_{1-4} alkyl, C_{6-10} aryl,

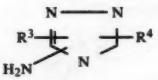
R^2=CHO, COOH, COONa, CH_2COOH, CH_2COONa, $CONR^3_2$, $CONHR^3$,

R^3=H, C_{1-2} alkyl,

and a compound corresponding to formula II



and/or to formula III



III

in which

R^3 and R^4 may be the same or different and represent H, —NH_2, alkyl, alkenyl, cycloalkyl, aryl, alkoxy, alkylthio, alkylsulfonyl, sulfamoyl, acyl, —SH or a heterocyclic group.

4,987,060

CONCENTRATED PHOTOGRAPHIC DEVELOPER COMPOSITION AND METHOD OF MAKING IT

Carlo Marchesano, Savona, Italy, assignor to Minnesota Mining and Manufacturing Company, St. Paul, Minn.

Filed Mar. 23, 1990, Ser. No. 498,208

Claims priority, application Italy, Apr. 3, 1989, 19993 A/89

Int. Cl.[5] G03C *5/30, 5/24*

U.S. Cl. 430—434 **9 Claims**

1. A concentrated alkaline photographic developer composition, packaged in a single part to be diluted with water to form a ready to use developing solution for silver halide photographic materials, which composition comprises dihydroxybenzene developing agents, inorganic alkali agents, inorganic antioxidant agents, sequestering agents and antifoggants, wherein said inorganic antioxidant agents comprise Na_2SO_3 (sodium sulfite) and K_2SO_3 (potassium sulfite) in a molecular ratio of 1:1 to 1:3 in an amount of from 1.6 to 4 moles per liter, the molecular ratio between said inorganic antioxidant agents and the developing agents is from 1.5 to 4.00, and said concentrated developer composition has a specific gravity higher than 1.300 at 20° C.

4,987,061

HEAT DEVELOPABLE COLOR PHOTOGRAPHIC RECORDING ELEMENT

Günter Helling, Odenthal, and Manfred Peters, Leverkusen, both of Fed. Rep. of Germany, assignors to Reel/Frame Agfa-Gevaert Aktiengesellschaft, Leverkusen, Fed. Rep. of Germany

Continuation of Ser. No. 940,433, Dec. 11, 1986, abandoned. This application Oct. 24, 1989, Ser. No. 426,521

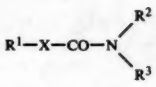
Claims priority, application Fed. Rep. of Germany, Dec. 21, 1985, 3545607

Int. Cl.[5] G03C *1/76*

U.S. Cl. 430—531 **4 Claims**

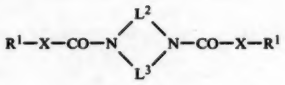
1. A color photographic recording element developable by heat treatment comprising a layer support having thereon one or more hydrophilic layers, at least one of said hydrophilic

layers, containing a photosensitive silver, halide emulsion which has a dye-releasing compound associated therewith, wherein the binder in at least one of said hydrophilic layers consists of from 10 to 90% by weight of a hydrophilic binder and of from 90 to 10% by weight of a polymer containing recurring units having at least one group selected from the group consisting of urethane and urea groups which polymer is either a homopolymer or a copolymer containing recurring units of a polymerized monomer M which contains a polymerizable ethylenically unsaturated group and at least one of a urethane and a urea group and corresponds to one of formulae I, II and III



I

II



III

in which

X represents —O—, —R^4—;

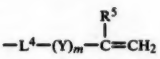
R^1 to R^4 may be the same or different and represent hydrogen, alkyl containing from 1 to 20 C-atoms, cycloalkyl, aryl, aralkyl or a heterocyclic radical, and in whi .

R^2 and R^3 or R^2 and R^4 and/or R^3 and R^4 may together represent the radical required to form a heterocyclic group, and at least one of the substituents R^1, R^2, R^3 and R^4 containing an ethylenically unsaturated copolymerizable group;

L^1 represents alkylene, arylene or aralkylene containing at most 18 C-atoms and

L^2 and L^3 may be the same or different and represent alkylene containing at most 10 C-atoms,

at least one of the radicals R^1 to R^4 is a radical corresponding to the following formula



IV

in which

L^4 is an optionally substituted alkylene, arylene or aralkylene group containing at most 18 C-atoms;

Y is a difunctional bond containing at least one heteroatom;

m=0 or 1 and

R^5 represents hydrogen, C_1–C_4 alkyl or halogen, said homopolymer consisting solely of recurring units of said polymerized monomer M and said copolymer containing, in addition to at least 10% by weight of the recurring units of said polymerized monomer M, up to 90% by weight of the recurring units of at least one other polymerized monomer C which is ethylenically unsaturated and thereby copolymerizable with said monomer M, said monomer C not containing a urethane group or a urea group and not being capable of dye formation under photographic processing conditions.

4,987,062

PROCESS FOR PREPARING A SILVER HALIDE EMULSION

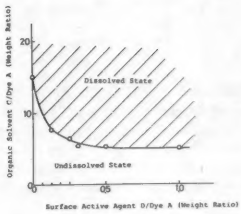
Fumitaka Terai, Saitama; Hiroyuki Yamagami, Kanagawa; Nobuhiko Uchino, Kanagawa, and Masaki Okazaki, Kanagawa, all of Japan, assignors to Fuji Photo Film Co., Ltd., Kanagawa, Japan

Filed Jul. 5, 1989, Ser. No. 375,559

Claims priority, application Japan, Jul. 4, 1988, 63-164910; Jul. 4, 1988, 63-164911; Jul. 12, 1988, 63-171878

Int. Cl.[5] G03C *1/10*

U.S. Cl. 430—546 **4 Claims**



1. A process for preparing a silver halide emulsion, comprising the steps of dissolving one or more substantially water-insoluble photographic additives in a solution of an organic solvent containing a surface active agent having a hydrophilic —SO_3 or —OSO_3 group and a small amount of a base, or small amounts of a base and an acid present in the solution prior to addition of the one or more substantially water-insoluble photographic additives wherein said organic solvent is an alcohol, and then adding the resulting solution to a silver halide emulsion.

4,987,063

GRADATION VARIABLE BLACK- AND -WHITE PAPER

Helmut Kampfer, Cologne; Walter Pätzold, Leverkusen, and Günther Mahlberg, Bergisch-Gladbach, all of Fed. Rep. of Germany, assignors to AGFA-Gevaert Aktiengesellschaft, Leverkusen, Fed. Rep. of Germany

Filed Nov. 10, 1988, Ser. No. 269,564

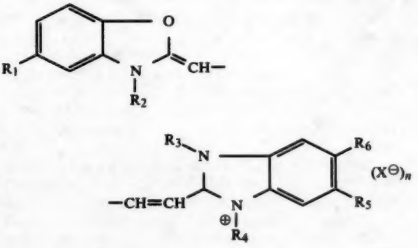
Claims priority, application Fed. Rep. of Germany, Nov. 24, 1987, 37397834

Int. Cl.[5] G03C *1/19*

U.S. Cl. 430—550 **4 Claims**

1. Gradation variable black and white paper containing a light sensitive silver halide emulsion layer, characterized in that 20 to 80% by weight of the silver halide is green sensitized with a compound corresponding to the following formula:

(I)



wherein

R_1 denotes chlorine,

R_2 denotes alkyl, sulphoalkyl or carboxyalkyl,

R_3 denotes alkyl, hydroxyalkyl or acyloxyalkyl,
R_4 denotes alkyl, sulphoalkyl or carboxyalkyl,
R_5 denotes chlorine,
R_6 denotes hydrogen or R_5,
$X^{\ominus}$ denotes an anion and
n stands for 0 or 1,
and n stands for 0 when one of the groups denoted by R_2 or R_4 is sulphoalkyl or carboxyalkyl and n stands for 1 when neither of the groups denoted by R_2 and R_4 is sulphoalkyl or carboxyalkyl, in a quantity of from

$$\frac{10}{d} \text{ to } \frac{80}{d} \text{ μmol/mol}$$

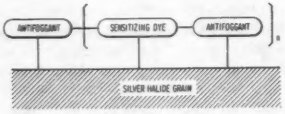
of silver halide $\bar{d}$ being the average grain diameter of the silver halide in μm.

4,987,064

SILVER HALIDE PHOTOGRAPHIC MATERIALS

Mitsuo Saitou; Toshinao Ukai, and Tadashi Ikeda, all of Kanagawa, Japan, assignors to Fuji Photo Film Co., Ltd., Kanagawa, Japan

Filed Dec. 8, 1989, Ser. No. 448,050
Claims priority, application Japan, Dec. 9, 1988, 63-311518; Jun. 7, 1989, 1-144724
Int. Cl.[5] G03C *1/10, 1/34*
U.S. Cl. 430—570 **15 Claims**



1. A silver halide photographic material comprising a support having thereon an emulsion layer comprising a dispersion medium, silver halide grains, and a pendant type sensitizing dye, wherein said pendant type sensitizing dye is a compound comprising a sensitizing dye and an antifoggant, each of which may have substituent groups and wherein said sensitizing dye and antifoggant are organochemically bonded.

4,987,065

IN VIVO LABELLING OF POLYNUCLEOTIDE SEQUENCES

Jannis Stavrianopoulos, New York, N.Y.; Heuy-Lang Yang, Tenafly, N.J., and Norman E. Kelker, New York, N.Y., assignors to Enzo Biochem, Inc., New York, N.Y.

Continuation of Ser. No. 510,975, Jul. 5, 1983, abandoned. This application Dec. 2, 1985, Ser. No. 803,532
Int. Cl.[5] C12Q *1/70, 1/68*
U.S. Cl. 435—5 **25 Claims**

1. A process for in vivo labeling of hybridizable polynucleotide sequences with modified nucleic acid bases, comprising the steps of:

(a) providing a host, whose genetic information comprises

(i) a first polynucleotide sequence capable of incorporating at least one modified base upon replication and a second polynucleotide sequence which confers upon said host, a requirement for an exogenous source of a base, or

(ii) a first polynucleotide sequence having a base capable of being enzymatically modified upon replication, and a second polynucleotide sequence of bacteriophage origin, that is capable of coding for an enzyme that modifies the modifiable base of the first polynucleotide sequence;

(b) replicating said host under conditions that provide or permit production of such modified base, such that it becomes part of and thereby labels the first polynucleotide sequence, so as to yield a labeled polynucleotide probe; and

(c) isolating said labeled polynucleotide probe.

4,987,066

PROCESS FOR THE DETECTION OF RESTRICTION FRAGMENT LENGTH POLYMORPHISMS IN EUKARYOTIC GENOMES

Jörg T. Epplen, Freiburg, Fed. Rep. of Germany, assignor to Max Planck-Gesellschaft Zur Forderung der Wissenschaften E.V., Fed. Rep. of Germany

Filed Sep. 25, 1987, Ser. No. 101,218
Claims priority, application European Pat. Off., Nov. 7, 1986, 86115460.7
Int. Cl.[5] C12Q *1/68;* C07H *15/12;* C12N *15/00*
U.S. Cl. 435—6 **26 Claims**

1. In a process for the determination of the genetic interrelationships of individuals comprising analysis of eukaryotic DNA wherein DNA of an individual is isolated, the DNA is subjected to restriction endonuclease digests, the cleaved DNA is separated by gel electrophoresis, the gel is dried and hybridized with a probe, and the pattern of the DNA is evaluated and compared to that of other individuals, the improvement which comprises use of a probe which comprises a chemically synthesized oligonucleotide which specifically hybridizes to eukaryotic simple tandem repeats having a periodicity of 2 to 4 bases.

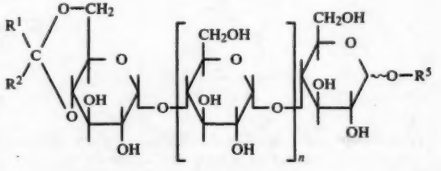
4,987,067

MALTOOLIGOSACCHARIDE DERIVATIVES AND REAGENTS FOR DETERMINATION OF AMYLASE ACTIVITY

Katsutoshi Ishimaru, Fukuoka; Akira Shimada, Moriguchi; Shinichi Teshima, Tsuruga, and Yuzo Hayashi, Takarazuka, all of Japan, assignors to Yoshitomi Pharmaceutical Industries, Ltd. and Toyo Boseki Kabushiki Kaisha, both of Osaka, Japan

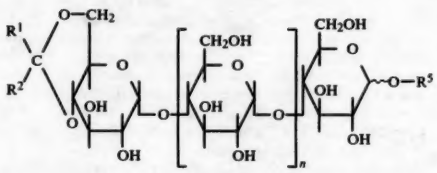
Filed Dec. 2, 1988, Ser. No. 279,105
Claims priority, application Japan, Dec. 11, 1987, 62-314379
Int. Cl.[5] C12Q *1/40;* C07H *15/24*
U.S. Cl. 435—22 **6 Claims**

1. A maltooligosaccharaide derivative represented by the general formula:



wherein at least one of R^1 and R^2 denotes a radical represented by: $R^3—S(O)_m—R^4$, and the remainder denotes a hydrogen, an alkyl radical containing 1 to 6 carbon atoms or a phenyl radical, in which R^3 is an alkyl radical containing 1 to 5 carbon atoms, R^4 is an alkylene radical containing 1 to 5 carbon atoms, and m is 1 or 2; R^5 denotes a phenyl radical unsubstituted or substituted by halogen, hydroxy, alkyl of 1 to 6 carbon atoms, alkoxy, alkoxycarbonyl or nitro; and n denotes an integer of 1 to 8.

3. A reagent for the determination of α-amylase activity comprising a maltooligosaccharide derivative represented by the general formula:



wherein at least one of R^1 and R denotes a radical represented by: $R^3—S(O)_m—R$ or $R^3—CO—R^4$, and the remainder denotes a hydrogen, an alkyl radical containing 1 to 6 carbon atoms or a phenyl radical, in which R^3 is an alkyl radical containing 1 to 5 carbon atoms, R^4 is an alkylene radical containing 1 to 5 carbon atoms, and m is 1 or 2; R^5 denotes a phenyl radical unsubstituted or substituted by halogen, hydroxy, alkyl of 1to 6 carbon atoms, alkoxy, alkoxycarbonyl or nitro; and n denotes an integer of 1 to 8, and

an adjuvant enzyme.

4,987,068

POROUS INORGANIC SUPPORT SPHERES WHICH CAN BE CLEANED OF SURFACE BIOMASS UNDER FLUIDIZED BED CONDITIONS

Walter Trösch, Stuttgart; Werner Kiefer, Mainz; Karlheinz Lohmann, Mainz, and Hans Dürolf, Mainz, all of Fed. Rep. of Germany, assignors to Schott Glaswerke, Mainz, Fed. Rep. of Germany

Filed Nov. 16, 1987, Ser. No. 121,256

Claims priority, application Fed. Rep. of Germany, Nov. 15, 1986, 3639153

Int. Cl.[5] C12P *1/00*; C12N *11/14, 5/02*

U.S. Cl. 435—41 **12 Claims**

1. In a process of culturing microorganisms or animal cells on a support material in a bed reactor, the improvement wherein the support material is porous sintered bodies comprising open-pore inorganic sintered material, containing inwardly continuous and outwardly open pores, in which microorganisms or animal cells can be immobilized and multiply, and

said sintered bodies being spheres having a density and diameter sufficient to be fluidized in a fluidized bed stream such that sufficient shear forces can be produced on the sphere surfaces to shear off microorganisms or animal cells grown out of the pores of the spheres and on the surface thereof,

and wherein said culturing is carried out by culturing the microorganisms or animal cells at least a part of the time under intermittent fluidized bed conditions such that the spheres are fluidized and sufficient shear forces are produced on the surface of the spheres so as to shear off essentially all of the microorganisms or animal cells grown out of the pores of the spheres and on the surface thereof to prevent a buildup of microorganisms or animal cells on the surface of the spheres which would otherwise suppress the shearing process.

4,987,069

NUCLEOTIDE SEQUENCE CAPABLE OF INDUCING HIGH LEVELS OF TRANSLATION OF A HETEROLOGOUS GENE IN *BACILLUS SUBTILIS* AND *ESCHERICHIA COLI*

Guido Grandi, Segrate, Italy, assignor to Eniricerche S.p.A., Milan, Italy

Filed Apr. 21, 1987, Ser. No. 40,612

Claims priority, application Italy, May 7, 1986, 20344 A/66

Int. Cl.[5] C12P *21/00*; C14N *15/00*; C07H *15/12*

U.S. Cl. 435—69.1 **4 Claims**

1. A nucleotide sequence capable of inducing high levels of translation of the coding gene for beta-lactamase in *B. subtilis* and *E. coli* comprising

5′ CTTAATTCT 3′
3′ CAATTAAGA 5′

said sequence being inserted in the hybrid plasmid pSM 164 between the ribosomal recognition site and the starting triplet, ATG, of the coding gene for beta-lactamose.

4,987,070

USE OF A 97 AMINO ACID LEADER SEQUENCE FROM THE *E. COLI* B-GALACTOSIDASE GENE FOR THE PRODUCTION OF HANP AND HPTC AS FUSION PROTEINS

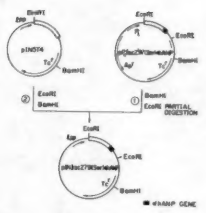
Koji Magota, Osaka; Takehiro Oshima, Tochigi, and Shoji Tanaka, Hyogo, all of Japan, assignors to Suntory Limited, Osaka, Japan

Filed Mar. 3, 1988, Ser. No. 163,548

Claims priority, application Japan, Mar. 4, 1987, 62-47796

Int. Cl.[5] C12P *21/02*

U.S. Cl. 435—69.7 **6 Claims**



1. A process for production of a target peptide, comprising the steps of:

(a) culturing *Escherichia coli* transformed with a plasmid capable of expressing a fusion protein under control of a promoter of *E. coli* origin or a promoter of phage origin, wherein the fusion protein is represented by the following formula:

A—L—B

wherein

B represents the target peptide; A represents a partner polypeptide which is a part of an *E. coli* β-galactosidase protein from the first amino acid residue to the 97th amino acid residue wherein cysteine at the 76th position in the β-galactosidase protein is replaced by a serine residue; and

L represents a linker peptide having at its C-terminal a linker amino acid residue which linker peptide positions between a C-terminal of the partner polypeptide and an N-terminal of the target peptide wherein the same amino acid as the linker amino acid is not present in the target peptide, and the linker amino acid is selected so that the peptide bond between the C-terminal of the linker amino acid and the N-terminal of the target peptide is cleaved by a protease or the linker amino acid is selectively degraded by a chemical substance;

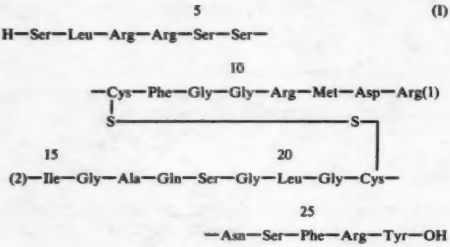
(b) disrupting the cultured cells and obtaining an insoluble fraction containing the fusion protein;

(c) solubilizing the fusion protein with a solubilizing agent;

(d) treating the solubilized fusion protein with a protease or a chemical substance to liberate the target peptide; and

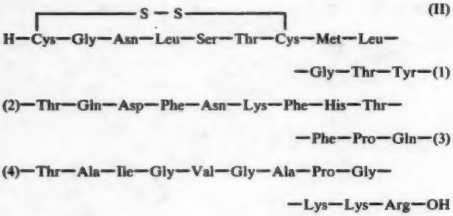
(e) isolating the target peptide; wherein the target peptide is selected from the group consisting of α-hANP having the following structure (I):

(I)



wherein (1) is directly bonded with (2), and a human calcitonin precursor (HPCT) having the following formula (II):

(II)



wherein (1) is directly bonded with (2), and (3) is directly bonded with (4).

4,987,071

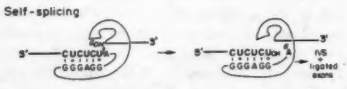
RNA RIBOZYME POLYMERASES, DEPHOSPHORYLASES, RESTRICTION ENDORIBONUCLEASES AND METHODS

Thomas R. Cech, Boulder; Arthur J. Zaug, Louisville, and Michael D. Been, Boulder, all of Colo., assignors to University Patents, Inc., Westport, Conn.

Filed Dec. 3, 1986, Ser. No. 937,327

Int. Cl.[5] **C12D** *19/34;* **C12N** *15/00, 9/10, 9/12;* **C07H** *15/12;* **B01J** *31/00*

U.S. Cl. 435—91 **63 Claims**



1. An enzymatic RNA molecule not naturally occurring in nature having an endonuclease activity independent of any protein, said endonuclease activity being specific for a nucleotide sequence defining a cleavage site comprising single-stranded RNA in a separate RNA molecule, and causing cleavage at said cleavage site by a transesterification reaction.

4,987,072

MACROCYCLIC ANTIBIOTICS

Hans Reichenbach, Wolfenbüttel; Gerhard Höfle, Braunschweig; Hermann Augustiniak, Wolfenbüttel; Norbert Bedorf, Königslutter; Klaus Gerth, Braunschweig; Herbert Irschik, Wolfenbüttel; Rolf Jansen, Braunschweig; Brigitte Kunze, Braunschweig; Dietmar Schomburg, Braunschweig; Heinrich Steinmetz, Hildesheim-Sorsum; Wolfram Trowitzsch-Kienast, and Victor Wray, both of Braunschweig, all of Fed. Rep. of Germany, assignors to Gesellschaft fur Biotechnologische Forschung GmbH, Braunschweig-Stockheim, Fed. Rep. of Germany

Filed Sep. 11, 1986, Ser. No. 907,446

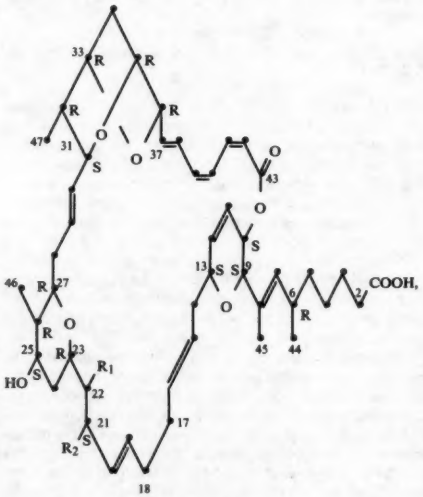
Claims priority, application Switzerland, Sep. 13, 1985, 3986/85

Int. Cl.[5] **C12P** *17/18, 19/60, 17/02;* **C12N** *1/20*

U.S. Cl. 435—119 **2 Claims**

1. A process for the preparation of a compound of formula:

(I)



wherein R represents that the substituents on the adjacent carbon atom are in the R configuration; S represents that the substituents on the adjacent carbon atom are in the S configuration; R_1 is hydrogen or hydroxy and R_2 is hydroxy or β-glucopyranosyloxy and, if R_1 is hydroxy, the C-22 atom has the S-configuration, or of a solvate or salt thereof which comprises culturing the strain So ce 12 (NCIB) 12134) of the species *Sorangium cellulosum* or a mutant derived from said strain that produces compounds of formula I, in a culture medium containing a source of carbon and nitrogen and essential inorganic salts, in the temperature range from about 20° to 40C. and at a pH in the range from about 4.0 to 8.0, under aerobic conditions and isolating the resultant compound into a salt and/or a resultant salt into the free compound or into another salt.

4,987,073

BACTERIOPHAGE CLONING SYSTEM FOR THE CONSTRUCTION OF DIRECTIONAL DNA LIBRARIES

Michael L. Berman, Potomac; P. Scott Meissner, Barnesville, and William P. Sisk, Kensington, all of Md., assignors to Akzo N.V., Arnhem, Netherlands

Continuation-in-part of Ser. No. 366,270, Jun. 12, 1989, abandoned, which is a continuation of Ser. No. 45,099, May 1, 1987, abandoned. This application Mar. 14, 1990, Ser. No. 494,844

Int. Cl.[5] C12P *19/34;* C12N *15/00;* C07H *15/12*

U.S. Cl. 435—172.3 10 Claims

1. A highly efficient method for modifying and unidirectionally inserting cDNA into a cloning vector, comprising:

synthesizing a double stranded oligonucleotide linker comprising a complete restriction enzyme recognition site joined to nucleotides comprising a different and incomplete restriction enzyme recognition site, such sites being in a 5'-incomplete-complete-3' configuration;

ligating the linker to both ends of a double stranded cDNA fragment to form a cDNA-linker composition such that an incomplete restriction enzyme recognition site is reconstituted to a complete restriction enzyme site only at the 3' poly A end of the cDNA fragment;

cleaving said cDNA-linker composition with two different restriction enzymes, said enzymes being specific for said restriction sites resulting in a cDNA with two asymmetrical restriction enzyme recognition sites; and

inserting unidirectionally the cleaved cDNA with asymmetrical restriction enzyme recognition sites into a vector containing complementary asymmetrical sites.

4,987,074

METHOD FOR PRODUCING THE HGIAI RESTRICTION ENDONUCLEASE AND METHYLASE

Keith D. Lunnen, Newbury, and Geoffrey G. Wilson, Boxford, both of Mass., assignors to New England Biolabs, Inc., Beverly, Mass.

Filed Dec. 17, 1987, Ser. No. 134,001

Int. Cl.[5] C12N *15/52, 9/22, 1/21*

U.S. Cl. 435—172.3 10 Claims

1. Isolated DNA coding for the HgiAI restriction endonuclease, wherein the isolated DNA is obtainable from the vector pKL170RM111-14.

4,987,075

METHOD OF MAKING AN ENZYME MEMBRANE FOR ENZYME ELECTRODES

Jürgen Nentwig, Berlin; Frieder Scheller, Zepernick; Günter Hanke, Schwerin; Wolfgang Breitmoser, Wittenberge; Hartmut Weise; Dorothea Pfeiffer, both of Berlin; Anette Nünchert, Babelsberg; Florian Schubert, Berlin; Christoph Meiske, Schwaneback, and Siegfried Kühnel, Dresden, all of German Democratic Rep., assignors to Akademie der Wissenschaften, Berlin, Fed. Rep. of Germany

Continuation of Ser. No. 455,916, Dec. 21, 1989, abandoned, which is a continuation of Ser. No. 219,585, Jul. 15, 1988, abandoned. This application Jul. 19, 1990, Ser. No. 555,788

Claims priority, application German Democratic Rep., Jul. 23, 1987, 3042802; Jul. 23, 1987, 3052816

Int. Cl.[5] G01N *27/30*

U.S. Cl. 435—182 8 Claims

1. A method for preparing a composite, multilayer membrane, which comprises uniformly dispersing one or more enzymes in a liquid solution of a polyurethane, applying droplets of the solution with the dispersed enzyme therein to a first cellulose membrane to form an enzyme film layer, drying the so applied solution, and bonding with a liquid adhesive a second cellulose membrane to the dried solution.

4,987,076

URICASE AND A METHOD FOR THE PREPARATION THEREOF

Masachika Takashio, Yaizu; Takahide Chikano, Shizuoka, and Minoru Kamimura, Yaizu, all of Japan, assignors to Sapporo Breweries Limited, Tokyo, Japan

Division of Ser. No. 866,572, May 22, 1986. This application Aug. 9, 1989, Ser. No. 391,432

Claims priority, application Japan, Jun. 5, 1985, 60-120399

Int. Cl.[5] C12Q *1/62;* C12N *9/54, 9/80, 9/06*

U.S. Cl. 435—191 1 Claim

1. A uricase derived from a thermophilic Bacillus sp. TD-90 (FERM BP-795) microorganism and characterised as follows:

(1) action: oxidatively decomposes uric acid;

(2) optimum pH for enzyme activity: pH from 5 to 10;

(3) the effect of pH on stability; at a pH from 5 to 9, activity is maintained during storage for 15 days at 30° C.;

(4) optimum temperature for enzyme activity is 45° to 50° C.;

(5) the effect of temperature on stability: no inactivation of the enzyme was observed after 10 minutes when the temperature was 50° C. or below therefor original activity was not lost;

(6) molecular weight: about 120,000.

4,987,077

PREPARATIONS OF PROTEASE ENZYMES DERIVED FROM ENTOMOPATHOGENIC FUNGI

Anthony K. Charnley, Avon; Richard M. Cooper, Corsham, both of England, and Raymond J. St. Leger, Ithaca, N.Y., assignors to Agricultural Genetics Company Limited, Cambridge, England

Filed May 24, 1988, Ser. No. 197,970

Claims priority, application Japan, Mar. 30, 1988, 63-77966; European Pat. Off., Mar. 31, 1988, 88302907.6

Int. Cl.[5] C12N *09/58, 09/48, 01/14, 01/00*

U.S. Cl. 435—223 3 Claims

1. An enzyme preparation comprising at least one protease derived from an entomopathogenic strain of a fungus belonging to one of the following species: *Metarhizium anisopliae, Beauveria bassiana, Verticillium lecanii* and *Aschersonia aleyrodis,* and characterized by the following properties:

(a) substantially no activity against hide protein azure, locust cuticle and elastin;

(b) specificity for Bz-Phe-Val-Arg-NA; and

(c) not inhibited by soybean trypsin inhibitor.

4,987,078

PLASMID VECTORS FOR EXPRESSION IN *ESCHERICHIA COLI* AND/OR *BACILLUS SUBTILIS*

Guido Grandi, Segrate; Antonio Mele, Pavia; Elisabetta Colletti, Milan; Susanna Campagnoli, Codogno, and Renzo Nogarotto, Motta di Livenza, all of Italy, assignors to Enitricerche S.p.A., Milan, Italy

Filed Mar. 19, 1986, Ser. No. 841,506

Claims priority, application Italy, Mar. 19, 1985, 19960 A/85

Int. Cl.[5] C12N *1/21, 15/57, 15/64, 15/70, 15/74*

U.S. Cl. 435—231 10 Claims

1. A plasmid vector useful for the expression of a heterologous protein in *Escherichia coli* wherein said plasmid vector comprises, in sequential order,

(1) a modified pE194 erythromycin promoter,

(2) a gene encoding for a heterologous protein, and

(3) the terminator of phage fd of *Escherichia coli,* wherein said modified pE194 erythromycin promoter comprises a pE194 erythromycin promoter having the −35 region thereof replaced by sequence (I) or (II) below:

5' CTGTTTTTTGTCAAT 3' (I)
3' TCGAGACAAAAAACAGTTAGATC 5'

5' CTGTTTTTTGTCAACAACTTTTTT 3' (II)
3' TCGAGACAAAAAACAGTTGTTGAAAAAAGATC
5'.

4,987,079

COMPOSITION AND METHOD FOR IN VITRO CELL CULTURE

James S. Cullor, 128 Shasta Pl., Woodland, Calif. 95615, assignor to Wilbur D. Smith; James Cullor; James S. Cullor and Gary W. Cullor, Fort Scott, Kans.

Continuation of Ser. No. 782,600, Sep. 30, 1985, abandoned, which is a continuation of Ser. No. 480,355, Mar. 30, 1983, abandoned, which is a continuation-in-part of Ser. No. 395,830, Jul. 6, 1982, abandoned. This application Aug. 4, 1989, Ser. No. 390,453

Int. Cl.[5] C12N *5/00, 5/06*

U.S. Cl. 435—240.2 6 Claims

1. A method of in vitro cell culturing comprising contacting cells to be cultured with a medium including a quantity of allantoic fluid derived from a pregnant animal having a placenta, and a quantity of serum added to the allantoic fluid which is not otherwise present in the allantoic fluid, and allowing said cells to culture in said medium.

4,987,080

METHOD FOR IN VITRO MATURATION OF OOCYTES

Howard S. Grob, 1 University Rd., Great Neck, N.Y. 11020, and Frank Friedman, Box 138, Quogue, N.Y. 11959

Filed Nov. 3, 1987, Ser. No. 115,994

Int. Cl.[5] C12N *5/00*

U.S. Cl. 435—240.25 20 Claims

1. A method for obtaining a quantity of reproductively competent oocytes which are capable of undergoing nuclear maturation which comprises:

(a) obtaining cells from the ovarian tissue of a mammal which cells comprise small and medium oocytes;

(b) incubating said cells in a first supplemented tissue culture medium wherein said supplements comprise effective amounts of (i) insulin, (ii) one or more thyroid hormones, (iii) one or more neurotransmitters and (iv) one or more purines;

(c) incubating said cells in a second supplemented tissue culture medium wherein said supplements comprise effective amounts of (i) insulin, (ii) one or more thyroid hormones, (iii) one or more gonadotropins and (iv) one or more purines; the effective amounts of said supplements and the time and conditions of said incubations in steps (b) and (c) taken together being sufficient for at least a portion of said small and medium oocytes to grow and develop into reproductively competent oocytes; and

(d) isolating said reproductively competent oocytes from said second tissue culture.

4,987,081

CHEMICAL/BIOLOGICAL PROCESS TO OXIDIZE MULTIMETALLIC SULPHIDE ORES

Ralph P. Hackl; Frank R. Wright, and Albert Bruynesteyn, all of North Vancouver, Canada, assignors to GB Biotech Inc., British Columbia, Canada

Division of Ser. No. 71,968, Jul. 10, 1987, Pat. No. 4,888,293. This application Mar. 23, 1988, Ser. No. 172,278

Int. Cl.[5] C01G *28/00*

U.S. Cl. 435—262 20 Claims

1. A process for oxidizing multi-metallic arsenic and sulphide-containing ores, the process comprising:

contacting the arsenic containing ore with a leach solution containing a mixed culture containing at least *Thiobacillus thiooxidans, Leptospirillum ferrooxidans* and *Thiobacillus ferrooxidans* in the first stage, at an Eh of less than 750 mV; and

contacting the products from the first stage with a leach solution containing a mixed culture containing at least *Thiobacillus thiooxidans, Leptospirillum ferrooxidans* and *Thiobacillus ferrooxidans* in a second stage, operated at an Eh of 750 mV or more.

4,987,082

CONTROL OF FOAM BUILD UP IN A FERMENTER

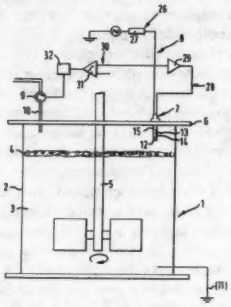
Stephen F. Gallagher, Maidstone, England, assignor to Shell Internationale Research, The Hague, Netherlands

Filed Aug. 4, 1989, Ser. No. 389,593

Claims priority, application United Kingdom, Aug. 5, 1988, 8818712

Int. Cl.[5] C12M *1/36*

U.S. Cl. 435—289 9 Claims



1. A method of controlling the build up of foam in a fermentation vessel, which comprises

supplying power to a detecting electrode positioned at a predetermined level in the fermentation vessel;

controlling the potential of a guard electrode positioned between the detecting electrode and the fermentation vessel such that a zero potential difference is maintained between the two electrodes; and

supplying a controlled amount of an antifoam substance into the fermentation vessel whenever foam causes a change in potential at the detecting electrode.

4,987,083

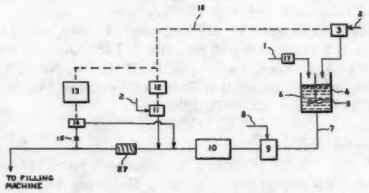
PHOTOMETRIC ANALYZER AND CONTROLLER FOR BEVERAGES

Glenn D. Apple, 808 Rockwood La., Newark, Del. 19713; Robert S. Saltzman, 6 Sorrel Dr., Surrey Park, Delaware, Del. 19803, and Stewart W. Sennet, 913 Bradley Dr., Wilmington, Del. 19808

Continuation-in-part of Ser. No. 947,318, Dec. 29, 1986, abandoned. This application May 18, 1988, Ser. No. 195,608

Int. Cl.[5] G01N *35/08*

U.S. Cl. 436—55 11 Claims



1. In a process for making carbonated beverages in which water is mixed with a syrup in a mixing vessel and the resulting mixture is passed into a carbonator and the beverage is carbonated and a flow stream of the resulting carbonated beverage is

passed into a filling machine and filled into containers in a filling line, the improvement used therewith comprises the steps of:

a. continuously removing sample of beverage from the flow stream after the beverage has been carbonated and before the beverage is filled into containers and then passing the sample of beverage into a cell of a photometric analyzer and photometrically measuring the concentration of syrup in the sample which generates a signal and returning the sample to the flow stream;

b. feeding the signal to a process controller which compares the signal to a signal stored in the controller that had been generated by the photometric analyzer of an analysis of a sample of a standard beverage containing a predetermined level of syrup concentration and the process controller precisely determines the deviation of syrup concentration of the sample from the standard;

c. adding a trim amount of water to the flow stream of the beverage after the beverage has left the mixing vessel and has been carbonated to control the syrup concentration of the beverage to the concentration level of the standard, wherein the process controller monitors and controls the trim amount of water being added;

d. passing the beverage through a static-in-line mixer to provide thorough mixing of the beverage.

6. A beverage analyzer and controller for use with a carbonated beverage mixing and container filling line in which water is mixed with a syrup in a mixing vessel and the resulting mixture is passed into a carbonator and the beverage is carbonated and a flow stream of the resulting carbonated beverage is passed into a filling machine and filled into containers; wherein the beverage analyzer and controller comprising:

a. a photometric analyzer containing a sanitizable sample cell which continuously photometrically analyzes the syrup content of a beverage sample flowing through the cell by comparing the absorbance at the sample wave length to that of a reference wave length and generates a signal;

b. a process controller which receives the signal from the photometric analyzer and compares the signal to a signal stored in the controller having been generated by the photometric analyzer of an analysis of a sample of a standard beverage containing a predetermined level of syrup concentration and precisely determines the deviation of syrup concentration of the sample from the standard;

c. valve means controlled by the process controller for adding a trim amount of water to the flow stream of the beverage after the beverage has left the mixing vessel and has been carbonated to control the syrup concentration of the beverage to the concentration level of the standard beverage; and

d. a static-in-line mixer for thoroughly mixing the beverage before analyzing and filling of the beverage into containers.

4,987,084

METHOD OF TESTING THE EFFECT OF A MOLECULE ON B LYMPHOCYTE FUNCTION

Thomas F. Tedder, Wellesley; Stuart F. Schlossman, and Haruo Saito, both of Newton, all of Mass., assignors to Dana Farber Cancer Institute, Boston, Mass.

Filed Feb. 21, 1989, Ser. No. 313,108

Int. Cl.[5] C12Q *1/02, 1/18;* G01N *33/48*

U.S. Cl. 436—63 **8 Claims**

1. A method of testing the effect of an agonist or an antagonist to B lymphocyte cell surface protein CD20 on B lymphocyte function comprising

determining calcium ion flux across the membrane of said B lymphocyte.

contacting said B lymphocyte with said agonist or antagonist, and

determining the change in calcium ion flux across said membrane after exposure of said B lymphocyte to said agonist or antagonist.

4,987,085

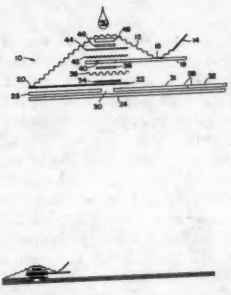
BLOOD FILTERING METERING DEVICE

Michael P. Allen, Sunnyvale; Urs A. Ramel, Portola Valley, and Anthony J. DeLizza, Sunnyvale, all of Calif., assignors to Chemtrak Inc., Sunnyvale, Calif.

Continuation-in-part of Ser. No. 195,881, May 19, 1988, and a continuation-in-part of Ser. No. 64,883, Jun. 22, 1987. This application Mar. 16, 1989, Ser. No. 324,407

Int. Cl.[5] G01N *21/00, 21/77, 31/22*

U.S. Cl. 436—169 **20 Claims**



1. A device for separating cells from blood to produce plasma and metering a predetermined amount of plasma to a reactant pad without significant red blood cell lysis, said device comprising:

a filtering system of descending pore size to provide for successive removal of red blood cells without significant red blood cell lysis;

a reactant pad for receiving said plasma sample from said filtering system; and

removable means for removing overflow sample from contact with said reactant pad.

4,987,086

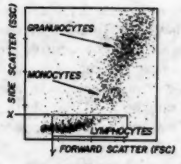
METHOD FOR ANALYSIS OF SUBPOPULATIONS OF CELLS

Jeanne M. Brosnan, Stanford, Calif., and Kenneth A. Ault, Brunswick, Me., assignors to Becton, Dickinson and Company, Franklin Lakes, N.J.

Filed Nov. 30, 1987, Ser. No. 126,333

Int. Cl.[5] C12Q *1/00;* G01N *33/53, 33/80, 33/533*

U.S. Cl. 436—501 **25 Claims**



1. In a method of identifying and enumerating two or more subpopulations of a population of cells of interest in a whole blood sample by means of flow cytometry, wherein the sample has been split into three aliquots, wherein the first aliquot is labeled with a first fluorescently labeled monoclonal antibody and a second fluorescently labeled monoclonal antibody that react differentially with all of populations of cells in such a

manner as to separate the populations from one another when both antibodies are used, the second aliquot is labeled with a first fluorescently labeled irrelevant control and a second fluorescently labeled irrelevant control, and the third aliquot is labeled with a third fluorescently labeled monoclonal antibody and a fourth fluorescently labeled monoclonal antibody that are different from the first and second monoclonal antibodies and react differentially with the cells of the subpopulations of interest, and wherein the fluorescent label on the first antibody, first control and third antibody are the same and the fluorescent label on the second antibody, second control and fourth antibody are the same but which has an emission spectra different from the other fluorescent label, the improvement comprising the steps of:

(a) establishing a cell population gate that will contain the maximum number of all cells in the population of interest with a minimum level of contamination from other cell populations by analyzing the first aliquot and selecting the gate based upon an analysis SSC and FL2 to set the SSC boundary and FSC and FL1 to set the FSC boundary and calculating the percentage of contamination of other populations of cells within the gate;

(b) establishing fluorescence markers for each of the fluorescence labels used by analyzing the second aliquot applying the gate from step (a) and selecting the markers based upon fluorescence emissions and calculating the percentage of non-specific staining in the sample; and

(c) analyzing the third aliquot using the gate and percent contamination from step (a) and the fluorescence markers and percent non-specific staining from step (b) to identify and enumerate cells in each subpopulation.

4,987,087

PROCESS FOR MANUFACTURING A THYRISTOR WITH PROTON IRRADIATION

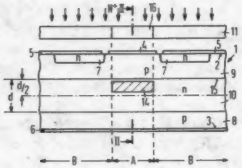
Peter Voss, Munich, Fed. Rep. of Germany, assignor to Siemens Aktiengesellschaft, Berlin and Munich, Fed. Rep. of Germany

Filed May 5, 1989, Ser. No. 348,231

Claims priority, application Fed. Rep. of Germany, May 19, 1988, 3817160

Int. Cl.[5] H01L *21/26*

U.S. Cl. 437—6 **18 Claims**



1. A process for making a thyristor comprising (a) a semiconductor body having a first major surface and a second major surface, (b) at least one control electrode on the first major surface, (c) a first base region in the semiconductor body connected with the control electrode, and (d) a second base region having a thickness "d" in the semiconductor body adjacent the first base region, the process comprising the steps of:

(1) irradiating one of the major surfaces of the semiconductor body with protons having a controlled energy, the energy of the protons being controlled such that a maximum defect density and doping produced by the proton irradiation lies in the second base region within a distance d/2 from a PN junction formed by the first and second base regions; and

(2) heat treating the semiconductor body after the proton irradiation.

4,987,088

FABRICATION OF CMOS DEVICES WITH REDUCED GATE LENGTH

Carlo Bergonzoni, Arcore; Tiziana Cavioni, Verbania, and Giuseppe P. Crisenza, Trezzo sull'Adda, all of Italy, assignors to SGS-Thomson Microelectronics s.r.l., Agrate Brianza, Italy

Filed Jul. 18, 1989, Ser. No. 381,283

Claims priority, application Italy, Jul. 29, 1988, 83653 A/88

Int. Cl.[5] H01L *21/265*

U.S. Cl. 437—34 **2 Claims**

1. In a process for fabricating CMOS integrated devices, the CMOS integrated devices having at least one of a polycrystalline silicon gate and a polycrystalline silicide gate, in which an n-type deep well diffusion region is formed in a portion of a surface of a p-type monocrystalline silicon substrate, and in which a transistor device having a p-type channel region is formed within the n-type deep well diffusion region, and in which a transistor device having an n-type channel region is formed external the n-type deep well diffusion region, the improvement comprising the step of:

performing an unmasked ion implantation of boron over the entire surface of the monocrystalline silicon substrate after having formed the n-type deep well diffusion region in order to effect simultaneously a partial compensation of a superficial doping level of the n-type deep well diffusion region and an enrichment of a superficial doping level of the monocrystalline silicon substrate external the n-type deep well diffusion region.

4,987,089

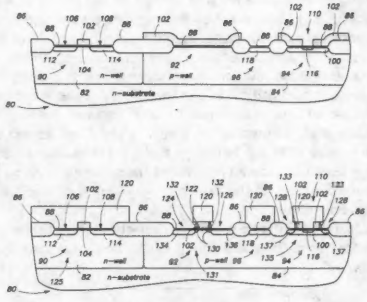
BICMOS PROCESS AND PROCESS FOR FORMING BIPOLAR TRANSISTORS ON WAFERS ALSO CONTAINING FETS

Ceredig Roberts, Boise, Id., assignor to Micron Technology, Inc., Boise, Id.

Filed Jul. 23, 1990, Ser. No. 556,907

Int. Cl.[5] H01L *21/265*

U.S. Cl. 437—34 **16 Claims**



1. A process for fabricating BiCMOS integrated circuits in p-type semiconductor wafers comprising the following steps:

forming a p-well, an n-well, and overlying field and gate insulating layers in a p-type wafer; defining a first portion in the p-well for formation of an n-channel MOS transistor, a second portion in an n-well for formation of a p-channel MOS transistor, a third portion in an n-well for formation of a bipolar npn transistor, and a fourth portion in the n-well containing the third portion for formation of a collector contact in such n-well;

selectively patterning and doping a p-type base implant into the third portion;

selectively patterning a layer of conductive material atop the field and gate insulating layers to define a gate and exposed source and drain areas of the n-channel MOS transistor in the first portion, to cover the second portion, to

selectively expose an area of the p-implanted third portion and to cover remaining areas of the p-implanted third portion, and to selectively expose the fourth portion;

doping exposed areas with n-type dopant material to a selected first concentration to form lightly doped drain regions in the p-well and the p-implanted third portion, the layer of conductive material masking without use of photoresist the second portion and covered areas of the third portion from implantation of n-type dopant material during the first concentration doping;

forming insulating spacers on exposed edges of the patterned conductive material to overlie at least the first and third portions and cover portions of the lightly doped drain regions therein;

doping exposed areas with n-type dopant material to a selected second concentration which is greater than the first concentration to form a source and a drain in the first portion, an emitter in the p-implanted third portion, and a collector contact region in the fourth portion, the layer of conductive material masking without use of photoresist the second portion and covered areas of the third portion from implantation of n-type dopant material during the second concentration doping;

selectively patterning with photoresist to define a gate and exposed source and drain areas of the p-channel MOS transistor in the second portion, to cover the emitter in the p-implanted third portion and expose a base contact region in the p-implanted third portion, to cover the collector contact region of the fourth portion, and to cover the first portion; and

doping exposed areas with p-type dopant material to a selected third concentration to form a source and a drain in the second portion and a base contact region in the p-implanted third portion.

4,987,090

STATIC RAM CELL WITH TRENCH PUL-DOWN TRANSISTORS AND BURIED-LAYER GROUND PLATE

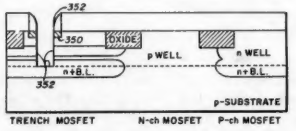
Fu-Chieh Hsu, Saratoga; Chun-Chiu D. Wong, Palo Alto, and Ciaran P. Hanrahan, Fremont, all of Calif., assignors to Integrated Device Technology, Inc., Santa Clara, Calif.

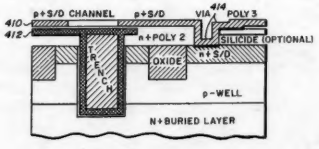
Continuation-in-part of Ser. No. 236,209, Aug. 23, 1988, Pat. No. 4,876,215, which is a division of Ser. No. 69,168, Jul. 20, 1987, Pat. No. 4,794,561. This application Jul. 25, 1989, Ser. No. 385,900

The portion of the term of this patent subsequent to Oct. 24, 2006, has been disclaimed.

Int. Cl.[5] H01L *21/70*

U.S. Cl. 437—52 **7 Claims**





1. In a method of fabricating a SRAM cell, wherein p-well regions, active island regions, conductive layers, loads, interconnections, insulators, contact hole openings, metal line definitions, and passivations are all formed on an epitaxial silicon layer, the improvement comprising in combination the steps of:

forming an isolated, buried, n+ layer on a psubstrate;

growing the epitaxial silicon layer on said substrate; performing a pull-down transistor threshold voltage adjustment;

forming in said grown epitaxial silicon layer at least one trench with a self-aligned drain-ring so that the bottom of said trench is inside said buried layer;

forming a dielectric in said trench; and

forming a conductive layer as a gate electrode for a trench transistor.

4,987,091

PROCESS OF FABRICATING DYNAMIC RANDOM ACCESS MEMORY CELL

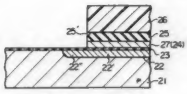
Hiroshi Kotaki, Tokyo, Japan, assignor to NEC Corporation, Tokyo, Japan

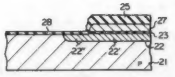
Filed Jan. 22, 1990, Ser. No. 468,212

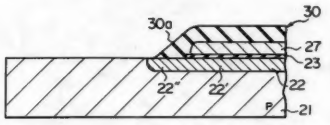
Claims priority, application Japan, Jan. 23, 1989, 1-13617

Int. Cl.[5] H01L *21/70*

U.S. Cl. 437—52 **19 Claims**







1. A process of fabricating a random access memory cell having a storage capacitor and a switching transistor, comprising the steps of:

(a) preparing an oxidizable semiconductor substrate having a capacitor forming portion;

(b) forming a dielectric film of said storage capacitor covering at least said capacitor forming portion and a transistor forming area of said oxidizable semiconductor substrate;

(c) forming a multiple-level structure having a first oxidizable conductive film on said dielectric film and a first insulating film on the first oxidizable conductive film, said multiple-level structure being provided on the entire structure;

(d) providing a first mask layer on said multiple-level structure and located over a capacitor electrode forming area;

(e) removing a surface portion of said first insulating film so that a hollow space extends beneath said first mask layer;

(f) removing said first insulating film and said first oxidizable conductive film by using said first mask layer, said hollow space causing a declining shoulder portion to take place at an upper edge of said first insulating film;

(g) removing said first mask layer;

(h) removing said dielectric film from said transistor forming

area so that a surface of said oxidizable semiconductor substrate is exposed;

(i) oxidizing said first oxidizable conductive film and said oxidizable semiconductor substrate for increasing the thickness of said first insulating film and for forming a second insulating film covering said transistor forming area;

(j) depositing a third insulating film on said first and second insulating films;

(k) removing a part of said third insulating film and said second insulating film by subjecting an anisotropic etching technique thereto for etching predominately in the vertical direction so that the surface of said oxidizable semiconductor substrate is exposed again, said third insulating film having a declining shoulder portion extending from an upper surface thereof to the surface of said oxidizable semiconductor substrate;

(l) growing a gate oxide of said switching transistor on the surface of said oxidizable semiconductor substrate;

(m) depositing a second conductive film on the entire surface; and

(n) patterning said second conductive film to form a gate electrode of said switching transistor.

4,987,092

PROCESS FOR MANUFACTURING STACKED SEMICONDUCTOR DEVICES

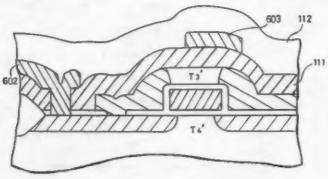
Kiyoteru Kobayashi; Tadashi Nishimura; Hiroshi Morita; Shuji Nakao; Hidekazu Oda, and Yasuo Inoue, all of Hyogo, Japan, assignors to Mitsubishi Denki Kabushiki Kaisha, Tokyo, Japan

Filed Jun. 9, 1988, Ser. No. 204,581

Claims priority, application Japan, Jun. 10, 1987, 62-145847

Int. Cl.[5] H01L *21/225*

U.S. Cl. 437—57 **16 Claims**



1. A method for manufacturing semiconductor devices, comprising the steps of:

preparing a semiconductor composite structure comprising a semiconductor substrate having a major surface and containing a predetermined concentration of an impurity of a first conductivity type;

forming in said semiconductor at said major surface first and second impurity regions of a second conductivity type spaced apart from each other, a portion of said substrate between said first and second impurity regions of the second conductivity type defining a first channel region;

forming a first insulating layer on said major surface of said substrate;

forming a first conductor layer on said first insulating layer at a location above said first channel region coextensively therewith, said first conductor layer having a top surface and two side surfaces, and covering the first conductor layer by a second insulating layer;

forming sidewalls on said two opposing side surfaces of said first conductor layer by covering the side surface with a second conductor layer containing an impurity of the first conductivity type with said second insulating layer interposed between said side surfaces and said second conductor layer;

forming a third conductor layer to cover said first and second insulating layer and said sidewalls; and

diffusing said impurity of the first conductivity type from within said sidewalls into said third conductor layer to form a pair of spaced apart impurity regions within said third conductor layers, whereby the region between said pair of spaced apart impurity regions within said third conductor layer forming a second channel region,

wherein said step of forming said sidewalls of the first conductivity type with said second conductor layer comprises a step of forming said sidewalls of the first conductivity type with a first single-crystal conductor layer,

wherein said first single-crystal conductor layer comprises a first single-crystal silicon layer, and

wherein said step of forming said sidewall structures of the first conductivity type with said first single-crystal silicon layer comprises the steps of

forming a second insulating layer on said top surface and said two side surfaces of said first conductor layer;

forming a first polysilicon layer on said first and second insulating layers;

converting said first polysilicon layer into a first single-crystal silicon layer of the first conductivity type; and

etching away said first single-crystal silicon layer leaving said sidewalls as they are.

4,987,093

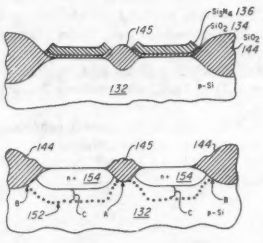
THROUGH-FIELD IMPLANT ISOLATED DEVICES AND METHOD

Clarence W. Teng, Plano, and Roger A. Haken, Dallas, both of Tex., assignors to Texas Instruments Incorporated, Dallas, Tex.

Division of Ser. No. 38,388, Apr. 15, 1987, Pat. No. 4,890,147. This application Oct. 24, 1989, Ser. No. 426,824

Int. Cl.[5] H01L *21/265, 21/76*

U.S. Cl. 437—69 **3 Claims**



1. A method of isolation fabrication of an integrated circuit having a surface with active regions, with at least some of said active regions containing NMOS transistors, said method comprising:

a. growing a field oxide on regions of the surface, said field oxide having at least two different widths, with some of said widths being substantially greater than 1 micron, and with some of said widths being less than about 1 micron, with said growing of field oxide creating an oxide-silicon interface beneath said oxide; and

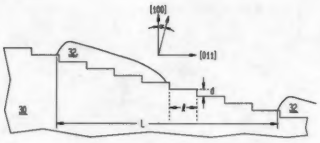
b. implanting channel stop dopants in said integrated circuit without active area masking, said implanting being at an energy high enough to implant channel stop dopants through field oxide in regions having widths less than about 1 micron to provide a maximum of implanting channel stop dopants in silicon under said oxide-silicon interface, but with said implanting being at an energy low enough to provide a maximum of implanting channel stop dopants within said field oxide regions having widths substantially greater than 1 micron.

4,987,094

METHOD OF MAKING A MACROSCOPIC STEPPED STRUCTURE ON A VICINALLY CUT CRYSTAL

Etienne G. Colas, Asbury Park, and Herbert M. Cox, Berkeley Heights, both of N.J., assignors to Bell Communications Research, Inc., Livingston, N.J.

Filed Jun. 2, 1989, Ser. No. 360,416
Int. Cl.[5] H01L *21/20*
U.S. Cl. 437—81 22 Claims



1. A method of fabricating macroscopic steps in a crystal, comprising the steps of:

providing a crystal of a material with a vicinal surface oriented at a vicinal angle to a major crystalline face of said crystal, microsteps thereby being formed in said vicinal surface;

forming at least two parallel lines of similar irregularities in said vicinal surface; and

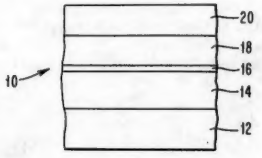
coalescing a substantial number of said microsteps between said lines into a macroscopic step.

4,987,095

METHOD OF MAKING UNPINNED OXIDE-COMPOUND SEMICONDUCTOR STRUCTURES

John Batey, Danbury, Conn.; Sandip Tiwari, Ossining, and Steven L. Wright, Peekskill, both of N.Y., assignors to International Business Machines Corp., Armonk, N.Y.

Filed Jun. 15, 1988, Ser. No. 207,700
Int. Cl.[5] H01L *29/78*
U.S. Cl. 437—106 37 Claims



1. A method of fabricating a passivated, compound semiconductor structure having a low interface state density comprising the steps of:

forming a compound semiconductor layer having a highly ordered, smooth surface with a stabilized reconstruction;

forming on said surface an epitaxial, single crystal, continuous layer of an elemental semiconductor material which unpins said compound semiconductor and having a thickness sufficient to prevent penetration of an insulator material formed in a subsequent step; and

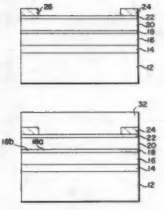
forming a layer of insulator on said layer of elemental semiconductor material.

4,987,096

MANUFACTURING METHOD OF SEMICONDUCTOR LASER WITH NON-ABSORBING MIRROR STRUCTURE

Masayuki Ishikawa, Nishimine; Hajime Okuda; Hideo Shiozawa, both of Yokohama; Kazuhiko Itaya, Tokyo; Yukio Watanabe, Yokohama; Mariko Suzuki, Yokohama, and Genichi Hatakoshi, Yokohama, all of Japan, assignors to Kabushiki Kaisha Toshiba, Kawasaki, Japan

Filed Dec. 13, 1989, Ser. No. 450,063
Claims priority, application Japan, Dec. 14, 1988, 63-315618
Int. Cl.[5] H01L *21/20*
U.S. Cl. 437—129 13 Claims



1. A method of manufacturing a semiconductor laser, comprising the steps of:

forming a double-heterostructure section of indium, gallium, aluminum, and phosphorus above a semiconductor substrate by a first metal organic chemical vapor deposition process, said double-heterostructure section including first and second cladding layers and an active layer sandwiched therebetween;

forming a first semiconductor layer on said double-heterostructure section;

selectively etching said semiconductor layer to form a stripe opening in said semiconductor layer; and

forming a second semiconductor layer on said first semiconductor layer to cover said opening by a second metal organic chemical vapor deposition process, whereby a band gap energy of said active layer is reduced in a first region located immediately below said opening, and a band gap energy of a second region except for said first region is increased to be higher than the band gap energy of said first region, said second region including a peripheral end corresponding to a light output end portion of said laser, so that self absorption of a laser beam at said light output end portion in an oscillation mode of said laser is suppressed.

4,987,097

METHOD OF MANUFACTURING A SEMICONDUCTOR LASER DEVICE

Koichi Nitta, Kawasaki; Yukie Nishikawa, Narashino; Masayuki Ishikawa, Nishimine; Yasuhiko Tsuburai, Sagamihara, and Yoshihiro Kokubun, Yokohama, all of Japan, assignors to Kabushiki Kaisha Toshiba, Kawasaki, Japan

Division of Ser. No. 307,927, Feb. 9, 1989, Pat. No. 4,922,499.
This application Feb. 28, 1990, Ser. No. 486,397
Claims priority, application Japan, Feb. 9, 1988, 63-26490; May 13, 1988, 63-116704; Jul. 11, 1988, 63-172312
Int. Cl.[5] H01L *21/20*
U.S. Cl. 437—129 7 Claims

1. A method of manufacturing a semiconductor laser device for oscillating visible light, comprising the steps of:

(a) forming a double-heterostructure disposed on a semiconductive substrate having a first conductivity type by semiconductor crystal growth, said double-heterostructure including

a semiconductive active layer, and

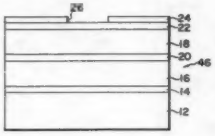
first and second cladding layers sandwiching said active layer and having different conductivity types, said first

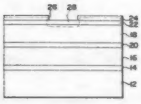
cladding layer consisting of a semiconductive material having the first conductivity type, said second cladding layer consisting of a semiconductive material having a second conductivity type;

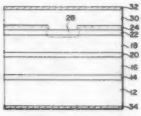
(b) forming by crystal growth a semiconductive layer on said second cladding layer;

(c) forming by crystal growth a semiconductive current-blocking layer of the first conductivity type having an elongated opening; and

(d) forming by crystal growth a semiconductive contact layer of the second conductivity type so as to cover said







current-blocking layer and said opening, the improvement wherein

a selected impurity is supplied in a crystal growth furnace from a timing prior to crystal growth of said contact layer, so that the impurity is at least locally doped in said semiconductive layer to increase a carrier concentration thereof, and wherein

said contact layer is formed by crystal growth after a furnace temperature is increased to a crystal growth temperature of said contact layer, which is lower than a temperature in crystal growth of said double-heterostructure.

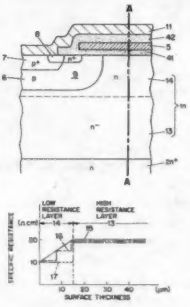
4,987,098

METHOD OF PRODUCING A METAL-OXIDE SEMICONDUCTOR DEVICE

Masaharu Nishiura, Nagano, and Kenya Sakurai, Matsumoto, both of Japan, assignors to Fuji Electric Co., Ltd., Kawasaki, Japan

Filed Aug. 10, 1989, Ser. No. 392,047
Claims priority, application Japan, Aug. 10, 1988, 63-199494
Int. Cl.[5] H01L *21/336*
U.S. Cl. 437—142 **3 Claims**

1. In a method for producing a metal-oxide semiconductor device comprising a semiconductor substrate of a first conductivity type with high-impurity density, which substrate functions as a drain layer, a transistor element disposed on a surface of the substrate, which transistor element comprises a low-impurity density region of the first conductivity type having a lifetime-reducing agent diffused therein, a base region of a second conductivity type embedded within the low-impurity density region of the first conductivity type and extending to a first surface of the transistor element, a high-impurity density region of the second conductivity type embedded within the base region and extending to the first surface of the transistor element, and a source region of the first conductivity type with high-impurity density embedded at the interface between the base region and the high-impurity density region of the second conductivity type, which source region extends to the first surface of the transistor element, whereby the first surface of the transistor element has the high-impurity density region, which is surrounded by the source region, which source region is in turn surrounded by the base region, which region is surrounded by the low-resistance layer, and a second surface of the transistor element, which surface is disposed toward the substrate, is the high-resistance material, and a gate electrode



disposed over a gate-insulating film, which is in turn disposed over all of the base region and the low-resistance material portion of the first surface of the transistor element but not over the high-impurity density region of the second conductivity type, the improvement comprising of forming the low-impurity density region of the first conductivity type as two sub-layers, a first sub-layer disposed proximately to the substrate having high resistance and a second sub-layer with a resistance about one half the resistance of the first sub-layer, the two sub-layers together forming a single region of low-impurity density prior to diffusion of the lifetime-reducing agent.

4,987,099

METHOD FOR SELECTIVELY FILLING CONTACTS OR VIAS OR VARIOUS DEPTHS WITH CVD TUNGSTEN

Janet Flanner, Union City, Calif., assignor to North American Philips Corp., New York, N.Y.

Filed Dec. 29, 1989, Ser. No. 459,047
Int. Cl.[5] H01L *21/48*
U.S. Cl. 437—192 **11 Claims**

5. A method for forming metallization to exposed semiconductor regions of a semiconductor device comprising the steps of:

(a) providing a substrate comprising a planarized surface disposed over at least two conductive regions, said surface having a first shallow aperture and a second deeper aperture disposed over and exposing said conductive regions;

(b) selectively depositing a conductive material to fill said first shallow aperture and to partially fill said second deeper aperture;

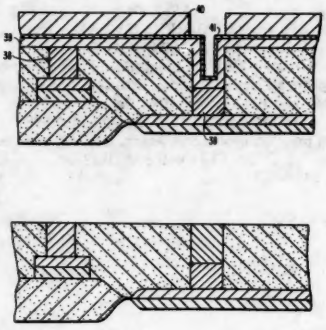
(c) depositing a dielectric layer over at least said filled first shallow aperture;

(d) masking the dielectric layer;

(e) selectively removing portions of the dielectric layer overlying the partially filled second deeper aperture to expose conductive material already deposited therein;

(f) selectively depositing an additional amount of conductive

material to substantially completely fill the second deeper aperture; and



(g) selectively removing at least portions of the dielectric layer overlying said first filled shallow aperture to provide a planarized surface.

4,987,100

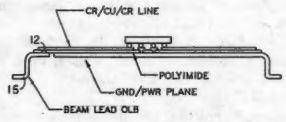
FLEXIBLE CARRIER FOR AN ELECTRONIC DEVICE

Donald G. McBride, Binghamton, and Theron L. Ellis, Vestal, both of N.Y., assignors to International Business Machines Corporation, Armonk, N.Y.

Division of Ser. No. 198,901, May 26, 1988, Pat. No. 4,937,707. This application Oct. 30, 1989, Ser. No. 429,807

Int. Cl.[5] H01L *21/60*

U.S. Cl. 437—206 11 Claims



1. The method of making an electronic package assembly, comprising the steps of:

providing a flexible carrier of an electrically conductive material;

forming a layer on said flexible carrier of an electrically insulating material;

forming vias in said layer of electrically insulating material at predetermined locations through to communicate with said flexible carrier;

metallizing said layer of electrically insulating material to include said vias; and

forming an electronic circuit from said metallization of said insulating material.

4,987,101

METHOD FOR PROVIDING IMPROVED INSULATION IN VLSI AND ULSI CIRCUITS

Carter W. Kaanta, Colchester, and Stanley Roberts, Burlington, both of Vt., assignors to International Business Machines Corporation, Armonk, N.Y.

Filed Dec. 16, 1988, Ser. No. 286,443

Int. Cl.[5] H01L *21/288*

U.S. Cl. 437—228 11 Claims

1. A method of providing an electrically insulating medium between a pair of superposed members comprising the steps of;

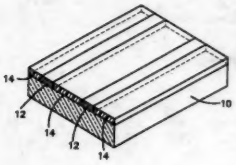
providing a base member of insulating material;

forming a plurality of discrete spaced support means extending upwardly from said base member;

depositing a selectively removable material on said base member around said support means;

providing a cap member of insulating material overlying said support means and said removable material;

forming access opening means in at least one of said cap or said base members communicating with said removable material;



removing said removable material through said access opening means without appreciably removing any of the base member or the cap member or the support means to thereby define a space between said base member and said cap member and around said support means and thereafter sealing said openings with insulating material;

thereby providing a space between said members and around said support means of a low dielectric constant.

4,987,102

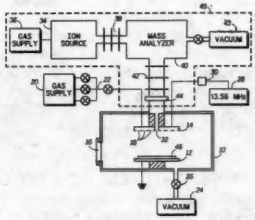
PROCESS FOR FORMING HIGH PURITY THIN FILMS

Bich-Yen Nguyen, Austin; Jen-Jiang Lee, Plano; Hoang K. Nguyen, Austin; Young Limb, Austin, and Philip J. Tobin, Austin, all of Tex., assignors to Motorola, Inc., Schaumburg, Ill.

Filed Dec. 4, 1989, Ser. No. 445,220

Int. Cl.[5] H01L *21/00, 21/02, 21/265;* C23C *14/34*

U.S. Cl. 437—238 20 Claims



1. A method for forming a thin film on a semiconductor substrate comprising the steps of:

supporting the substrate on a grounded electrode enclosed within a vacuum chamber;

introducing a first gas into said vacuum chamber;

energizing said first gas with RF energy coupled to a powered electrode enclosed within said vacuum chamber;

mass analyzing a second gas to obtain energized ions; and

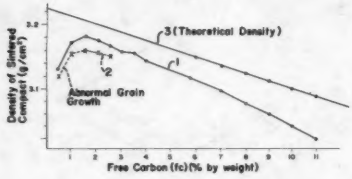
introducing said enrgized ions into said vacuum chamber to react with said energized first gas to form said thin film on said substrate.

4,987,103

SLIDER COMPOSED OF A HIGH-DENSITY SILICON CARBIDE SINTERED COMPACT

Hisashi Kinugasa, Takarazuka, and Nobuto Mukae, Sanda, both of Japan, assignors to Nippon Pillar Packing Co., Ltd., Osaka, Japan

Filed Mar. 21, 1986, Ser. No. 842,567
Int. Cl.[5] C04B 35/56
U.S. Cl. 501—89 6 Claims



1. A slider consisting essentially of a high-density silicon carbide sintered compact, sintered by pressureless sintering and containing 2–10% by weight of free carbon and 0.1 –0.3% by weight of titanium, and a relative density of not less than 95%, said high-density silicon carbide sintered compact containing boron and aluminum in the amount of 0.2–0.6% by weight with an atomic percentage thereof of $0.15 \leqq B/AL < 2$.

4,987,104

METHOD OF FORMING A CERAMIC PRODUCT

Mark B. Trigg, Mulgrave, Australia, assignor to Commonwealth Scientific & Industrial Research Organization, Campbell, Australia

PCT No. PCT/AU87/00072, § 371 Date Nov. 1, 1988, § 102(e) Date Nov. 1, 1988, PCT Pub. No. WO87/05597, PCT Pub. Date Sep. 24, 1987
PCT Filed Mar. 13, 1987, Ser. No. 272,804
Claims priority, application Australia, Mar. 14, 1986, PH5042/86
Int. Cl.[5] C04B 35/56, 35/58
U.S. Cl. 501—92 10 Claims

1. A method of forming a ceramic product by converting silica to silicon nitride in a carbothermal reduction process in the presence of nitrogen, fabricating the silicon nitride into the desired shape of the ceramic product and sintering the fabricated silicon nitride, characterised in that the carbothermal reduction process is partially completed so as to produce a mixture comprising residual silica and silicon nitride which is fabricated into the desired shape and is heated in a densification step in a nitrogen atmosphere at a temperature of from 1400° C. to 2000° C. to produce a ceramic product comprised of silicon nitride and silicon oxynitride.

4,987,105

CARBON/BORON NITRIDE RELEASE COATING

Joseph M. Wright, Santa Ana, Calif., assignor to Ford Aerospace Corporation, Newport Beach, Calif.

Filed Nov. 21, 1988, Ser. No. 274,527
Int. Cl.[5] C04B 35/58
U.S. Cl. 501—96 5 Claims

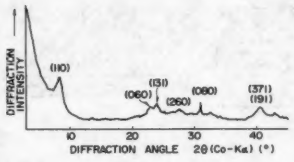
1. A composition useful for coating an article to be densified by hot isostatic pressing processing comprising boron nitride; carbon; and an effective amount of at least one carrier fluid selected from the group consisting of water, alcohols, ketones, ethers, substantially hydrocarbon materials which have a boiling point below about 200° C., and mixtures thereof; provided that said boron nitride and carbon are present in an amount effective to provide a coating on the article to which said composition is applied which coating is useful as a release agent in hot isostatic pressing processing of the article, and said carbon is present in an amount of up to about 30% by weight of the total said boron nitride and carbon present in said composition.

4,987,106

PROCESS FOR PRODUCING CLAY MINERAL OF CHAIN STRUCTURE

Tadashi Mizutani; Yoshiaki Fukushima; Haruo Doi, and Osami Kamigaito, all of Aichi, Japan, assignors to Kabushiki Kaisha Toyota Chuo Kenkyusho, Aichi, Japan

Filed Dec. 27, 1989, Ser. No. 457,835
Claims priority, application Japan, Dec. 27, 1988, 63-330810
Int. Cl.[5] C04B 33/00, 33/02
U.S. Cl. 501—147 14 Claims



1. A process for producing a clay mineral of chain structure which comprises suspending a metal silicate gel in an aqueous solution which has a pH value of 3–11 at room temperature and contains a clay mineral of chain structure suspending therein, and then heating the resulting suspension at a temperature below 350° C.

4,987,107

CERAMIC COMPOSITION FOR REDUCTION-REOXIDATION TYPE SEMICONDUCTIVE CAPACITOR

Kazuhito Narumi, Bibai; Fumio Takeuchi, and Michiaki Sakaguchi, both of Iwamizawa, all of Japan, assignors to Nippon Oil & Fats Co., Ltd., Tokyo, Japan

Filed Jun. 2, 1989, Ser. No. 360,607
Claims priority, application Japan, Jun. 3, 1988, 63-135695
Int. Cl.[5] C04B 35/46
U.S. Cl. 501—137 6 Claims

1. A ceramic composition for producing a reduction-reoxidation type semiconductive capacitor exhibiting a breakdown voltage exceeding 900 V, and insulation resistance exceeding $10^{10}\Omega$, a capacity per unit surface area exceeding 0.60 $\mu F/cm^2$ and tan δ of not more than 2.0%, consisting essentially of:

(a) barium titanate and titanium oxide;

(b) at least one oxide selected from the group consisting of oxides of La, Ce, Nb, Nd, Dy, Y, Sb, W and Ta, wherein the molar ratio of said barium titanate, and titanium oxide and said at least one oxide is 100:0.01 to 15:0.01 to 10; and

(c) 0.001 to 1% by weight based on the total amount of the elements (a) and (b), of at least one oxide selected from the group consisting of oxides of Cu, Zn, Mg and Mo.

4,987,108

DIELECTRIC PASTE

Hiroshi Takagi, Ohtsu; Yoshiaki Mori, Nagaokakyo; Hiroji Tani, Nagaokakyo, and Yukio Sakabe, Kyoto, all of Japan, assignors to Murata Manufacturing Co., Ltd., Japan

Filed Mar. 9, 1988, Ser. No. 169,394
Claims priority, application Japan, Mar. 11, 1987, 62-56204
Int. Cl.[5] H01B 3/00
U.S. Cl. 501—138 8 Claims

1. A dielectric paste comprising a dielectric powder composed of a dielectric material and a vitreous binder suspended in an organic vehicle, said dielectric material consisting essentially of a composition expressed by the general formula:

$$\{(Ba_{1-x-y-z}Sr_xCa_yMg_z)O\}_m(Ti_{1-u}Zr_u)O_2$$

wherein x, y, z, u and m take values within the following respective ranges: $0 \leqq x < 0.30$, $0 \leqq y < 0.30$, $0 \leqq z < 0.05$, $0 \leqq u < 0.25$, $1 \leqq m < 1.03$, said vitreous binder consisting essentially of a composition expressed by the general formula:

$$\alpha Li_2O\text{-}\beta BaO\text{-}\gamma B_2O_3\text{-}(1-\alpha-\beta-\gamma)SiO_2$$

wherein α, β and γ are molar ratios of the respective ingredients and take values within the following respective ranges: $0 \leqq \alpha < 0.25$, $0.1 \leqq \beta < 0.5$, $0.1 < \gamma < 0.5$, $0.3 < \alpha+\beta+\gamma < 0.8$, the content of the vitreous binder in the dielectric powder being not less than 5 wt % to less than 40 wt %.

4,987,109

ZEOLITES FOR REFORMING CATALYSTS

Jar-Lin Kao; Murray Nadler, both of Houston; Mark J. Potter, League City, and Roque V. Martir, Baytown, all of Tex., assignors to Exxon Chemcial Patents Inc., Linden, N.J.

Filed Oct. 19, 1988, Ser. No. 259,644

Int. Cl.[5] B01J *29/06*

U.S. Cl. 502—66 54 Claims

7. A reforming catalyst exhibiting enhanced selectivity, activity, and activity maintenance comprising:

zeolite crystals having a pH within the range of 9.4 to 10.0, wherein said pH is determined by measuring pH of supernatent liquid from a mixture of one part of said zeolite crystals with ten parts of dionized water by weight, and comprising exchangeable cations and at least oen catalytically active metal selected from the group consisting of Group VIII of the Periodic Table of Elements, tin and germanium.

22. A process for treating zeolite to have a pH within a range effective in imparting enhanced activity, selectivity and activity maintenance to catalysts loaded onto said zeolite, said process comprisign washing zeolite with an aqueous liquid in a manner so as to result with zeolite having a pH within the pH range of 9.4 to 10.0 wherein said pH is determined by measuring pH of supernatent liquid from a mixture of one part of said zeolite crystals with ten parts of dionized water by weight.

4,987,110

ATTRITION RESISTANT CRACKING CATALYST

Julius Scherzer, Anaheim, Calif., assignor to Union Oil Company of California, Los Angeles, Calif.

Continuation-in-part of Ser. No. 312,625, Feb. 17, 1989, Pat. No. 4,880,521, which is a continuation-in-part of Ser. No. 47,852, May 7, 1987, Pat. No. 4,810,369. This application May 31, 1989, Ser. No. 359,112

Int. Cl.[5] B01J *29/06, 21/16*

U.S. Cl. 502—68 29 Claims

1. An attrition resistant catalytic cracking catalyst comprising a molecular sieve dispersed in a matrix comprising a clay and a synthetic silica-alumina component, said catalyst made by the process comprising:

(a) combining said molecular sieve with said clay, a silica sol and aluminum chlorhydroxide to form a mixture consisting essentially of said molecular sieve, said clay, said silica sol and said aluminum chlorhydroxide; and

(b) drying said mixture to produce said attrition resistant catalyst.

4,987,111

CATALYST COMPONENT AND CATALYST FOR THE POLYMERIZATION OF ETHYLENE AND THE COPOLYMERIZATION OF ETHYLENE WITH ALPHA-OLEFINS

Fausto Calderazzo, Ghezzano; Guido Pampaloni, Pontedera; Francesco Masi, San Donato Milanese; Angelo Moalli, Castelletto Ticino, and Renzo Invernizzi, Milan, all of Italy, assignors to Enichem Anic, S.p.A., Palermo, Italy

Filed Sep. 6, 1989, Ser. No. 403,681

Claims priority, application Italy, Sep. 9, 1988, 21876 A/88

Int. Cl.[5] C08F *4/646*

U.S. Cl. 502—113 12 Claims

1. A solid catalyst component for the polymerization of ethylene and the copolymerization of ethylene with C_3–C_{10} alpha-olefins, having the formula

$$VTi_nCl_{4n}$$

wherein n varies from 1 to 3, said catalyst component prepared by a reaction of titanium tetrachloride with a vanadium arene ($V^*(arene)_2$) in accordance with the equation:

$$V^*(arene)_2 + nTiCl_4 \rightarrow VTi_nCl_{4n} + 2arene$$

wherein said arene is selected from unsubstituted benzene or benzene substituted with 1–3 alkyl groups, and having a particle size of from 5 to 20 μm, said particles having a surface area of from 10 to 70 m^2/g and a mean pore radius of from 10,000 to 20,000 Angstroms.

4,987,112

CATALYST TO ELIMINATE NOXIOUS SUBSTANCES CONTAINED IN THE EXHAUST GASES OF PREDOMINANTLY ALCOHOL FUELED INTERNAL COMBUSTION ENGINES, A PROCESS FOR ITS PREPARATION, AND USES

Bernd Engler, Hanau; Edgar Koberstein, Alzenau; Egbert Lox, Hanau, and Herbert Voelker, Zeiskam, all of Fed. Rep. of Germany, assignors to Degussa Aktiengesellschaft, Frankfurt am Main, Fed. Rep. of Germany

Filed Sep. 5, 1989, Ser. No. 404,949

Claims priority, application Fed. Rep. of Germany, Sep. 7, 1988, 3830317

Int. Cl.[5] B01J *21/04, 21/06, 23/28*

U.S. Cl. 502—255 17 Claims

1. A catalyst to eliminate noxious substances contained in the exhaust gases of predominantly alcohol fueled internal combustion engines, comprising a support of an aluminum oxide of the transition series and 0.5 to 30.0% by weight of molybdenum silicide ($MoSi_2$) based on the weight of aluminum oxide, said aluminum oxide support having one or more rare-earth metals in oxide form deposited thereon in the amount of from 0.5 to 70% by weight based on the weight of aluminum oxide and further having deposited on said support palladium in proportions of 0.03 to 3% by weight relative to the total weight of the aluminum oxide.

8. A process for preparing a catalyst to eliminate noxious substances contained in the exhaust gases of predominantly alcohol fueled internal combustion engines, comprising: providing a shaped catalyst support formed of a mixture of Al_2O_3 and $MoSi_2$, said Al_2O_3 being optionally lattice-stabilized, impregnating said shaped support in the weight ratio of 100 : 0.1–15 with a salt solution of rare-earth metal, drying and calcining at 250°–750° C. in air for 30 to 180 minutes, thereafter impregnating the shaped support with an aqueous solution containing a palladium salt and drying said impregnated support.

4,987,113

PREPARATION OF COAL LIQUEFACTION CATALYST

Tatsuo Fukuyama, Kawasaki; Toshihiko Okada; Sanseki Moriguchi, both of Yokohama; Yoshio Kamiya, Kawasaki, and Eisuke Ogata, Chiba, all of Japan, assignors to Nippon Kokan Kaubshiki Kaisha, Tokyo, Japan

Division of Ser. No. 921,795, Oct. 17, 1986, Pat. No. 4,820,405, which is a continuation of Ser. No. 779,239, Sep. 23, 1985, abandoned. This application Nov. 16, 1988, Ser. No. 272,234

Claims priority, application Japan, Sep. 29, 1984, 59-204231; Sep. 29, 1984, 59-204232; Sep. 29, 1984, 59-204235; Sep. 29, 1984, 59-204236; Sep. 29, 1984, 59-204237; Sep. 29, 1984, 59-204240

Int. Cl.[5] B01J *23/74;* C01G *49/02*

U.S. Cl. 502—338 6 Claims

1. A method for preparing a coal liquefication catalyst from laterite ore which contains catalyst poisons, comprising washing the laterite ore in water for a period of time sufficient to dissolve the catalyst poisons therefrom and removing said dissolved catalyst poisons, drying and then heating the ore to increase its specific surface area.

4,987,114

SOLID BASE AND PROCESS FOR PRODUCING THE SAME FOR PREPARING INTERNAL OLEFINS

Gohfu Suzukamo, Ibaraki, and Masami Fukao, Shiga, both of Japan, assignors to Sumitomo Chemical Company, Limited, Osaka, Japan

Division of Ser. No. 391,243, Aug. 9, 1989. This application Jul. 20, 1990, Ser. No. 554,859

Claims priority, application Japan, Aug. 12, 1988, 63-202464; Aug. 12, 1988, 63-202465

Int. Cl.[5] B01J *21/04, 23/02*

U.S. Cl. 502—341 26 Claims

1. A solid base obtainable by heating and reacting an alkaline earth metal compound with alumina at a temperature of from 300° to 600° C. and then heating and reacting the reaction product with at least one material selected from the group consisting of alkali metals and hydrides of alkali metals in an inert gas atmosphere at a temperature of from 200° to 450° C.

4,987,115

METHOD FOR PRODUCING GENERATOR GAS AND ACTIVATED CARBON FROM SOLID FUELS

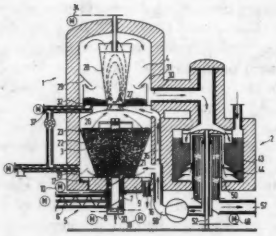
Herwig Michel-Kim, Bamberger Strasse 41, 1000 Berlin 30, Fed. Rep. of Germany

Filed Sep. 23, 1988, Ser. No. 248,808

Claims priority, application Fed. Rep. of Germany, Sep. 25, 1987, 3732867

Int. Cl.[5] C01B *31/10;* C10J *31/02, 31/06, 31/54*

U.S. Cl. 502—419 6 Claims



1. A method for producing generator gas and activated carbon from solid fuel, the method comprising the steps of:

initially gasifying the solid fuel in a first gasification stage, the first gasification stage comprising:

supplying an admixture of the solid fuel and preheated air, the solid fuel being supplied by an underfeed charging element, the solid fuel and air flowing in the same direction;

directing the solid fuel centrally inward, then outward and upward in a vessel, thereby symmetrically distributing the solid fuel and air admixture;

preburning a portion of the entering solid fuel in a precombustion chamber, the precombustion chamber communicating with the preheated air; and

reducing the oxygen content of the preheated air by precombustion in the precombustion chamber;

wherein the fuel upon leaving the first gasification stage consists essentially of coal and generator gas;

further gasifying the fuel from the first gasification stage in an intermediate gasification stage, the intermediate gasification stage comprising:

passing the first gasification stage fuel with a supply of secondary admixed air through a Venturi tube having a throat, and through a diffuser connected to the tube;

wherein the fuel upon leaving the intermediate gasification stage consists essentially of flue coal and generator gas substantially free from tar and phenols;

returning a portion of the flue coal entrained from the intermediate gasification stage to an area adjacent and prior to the Venturi tube throat, assisting the return mechanically and by a vaccum in the Venturi tube;

recycling at least some of said flue coal through said intermediate gasification stage whereby after a plurality of recyclings activated carbon is produced and recovered;

further gasifying the generator gas from the intermediate gasification stage in a third gasification stage, the third gasification stage comprising:

reacting the generator gas with a heated carbonaceous material chosen from a group consisting of glowing charcoal and glowing coke;

wherein the generator gas exiting the third gasification stage gives off heat, and the heat is used to heat the air for the first and second gasification stages.

4,987,116

METHOD OF PREPARING A COARSE-PORED FORMED CARBON

Alfons Karl, Herzbergstrasse 53, D-6466, Gruendau, Fed. Rep. of Germany, and Hartmut von Kienle, Hirschograben 21, D-6056, Heusenstamm-2, Fed. Rep. of Germany

Filed Oct. 3, 1989, Ser. No. 415,980

Claims priority, application Fed. Rep. of Germany, Oct. 12, 1988, 3834743

Int. Cl.[5] B01J *20/32, 20/20;* C01B *31/10*

U.S. Cl. 502—427 5 Claims

1. A method of preparing a coarse-pored formed carbon comprising the steps of:

(A) mixing charcoal dust, charcoal tar and sodium hydroxide solution to form a mixture, wherein the sodium hydroxide is present in the amount of 5 to 15% by weight relative to the amount of charcoal dust;

(B) kneading the mixture;

(C) shaping the kneaded mixture;

(D) low temperature carbonization of the shaped mixture in an atmosphere almost free of oxygen, at temperatures in the range of 300 to 900° C.; and

(E) activation with water vapor and/or carbon dioxide at temperatures in the range of 700 to 1200° C.

4,987,117

HEAT-SENSITIVE RECORDING MATERIAL

Yuichi Itabashi; Takayuki Hayashi, and Akira Igarashi, all of Shizuoka, Japan, assignors to Fuji Photo Film Co., Ltd., Kanagawa, Japan

Continuation of Ser. No. 327,840, Mar. 23, 1989, Pat. No. 4,923,844. This application Nov. 30, 1989, Ser. No. 443,291

Claims priority, application Japan, Mar. 23, 1988, 63-69053; Jun. 20, 1988, 63-151800

Int. Cl.[5] B41M 5/18

U.S. Cl. 503—200 6 Claims

1. A heat-sensitive recording material comprising a support having provided thereon a heat-sensitive recording layer, wherein a microporous interlayer (a) comprising at least one of a synthetic resin and cellulose compound prepared by casting a solution of a synthetic resin and/or a cellulose compound in a thin film on a support and then removing or exchanging the solvent is provided between said heat-sensitive recording layer and said support of said recording material.

4,987,118

HIGH-GRADE THERMAL RECORDING SHEET AND A METHOD OF MAKING THE SAME

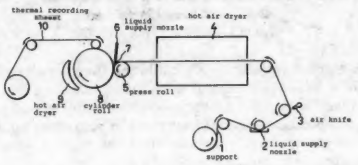
Masayuk Murata; Shinichiro Katsuta, and Tomoyuki Unno, all of Fuji, Japan, assignors to Kohjin Co., Ltd., Tokyo, Japan

Filed Dec. 14, 1987, Ser. No. 144,032

Claims priority, application Japan, Jun. 12, 1986, 61-134830; Oct. 20, 1986, 61-247631; Oct. 28, 1986, 61-254616; Dec. 29, 1986, 61-313215; Apr. 14, 1987, 62-89820

Int. Cl.[5] B41M 5/18

U.S. Cl. 503—200 11 Claims



1. A high-grade thermal recording sheet comprising a support and at least one thermal recording layer formed thereon and adapted for developing color when heated, said layer having a surface which is so smooth that when a first straight line extending in parallel to the centerline of a roughness curve as obtained in accordance with the method of JIS B 0601 crosses said roughness curve with a contact ratio of 10%, a second straight line extending in parallel to said centerline and between said centerline and said first straight line and having a distance of 1.5 μm from said first straight line crosses said roughness curve with a contact ratio of at least 84%.

4,987,119

CYAN DYES IN DYE-DONOR ELEMENTS FOR USE IN THERMAL DYE TRANSFER METHODS

Luc J. Vanmaele, Lochristi, and Wilhelmus Janssens, Aarschot, both of Belgium, assignors to AGFA-Gevaert, N.V., Mortsel, Belgium

Filed Feb. 27, 1990, Ser. No. 485,564

Claims priority, application European Pat. Off., Feb. 28, 1989, 89200490

Int. Cl.[5] B41M 5/035, 5/26

U.S. Cl. 503—227 6 Claims

1. Dye-donor element for use according to thermal dye transfer methods, said element comprising a support having thereon a dye/binder layer comprising a 2-N-alkyl-substituted carbamoyl-4[N-(p-substituted aminoaryl)-imino]-1,4-naphthoquinone cyan dye carried by a polymeric binder resin, wherein said cyan dye is a 2-N-alkyl-substituted carbamoyl-4-[N-(p-substituted aminoaryl)-imino]-1,4-naphthoquinone cyan dye, the N-alkyl group of which is methyl that is substituted with a branched-chain non-cyclic C_3–C_{18} alkyl group or the N-alkyl group of which is a C_2–C_4 straight chain alkyl group that on its omega-carbon atom is substituted with a branched chain C_3–C_{18} alkyl group, an aryl group, or a cycloalkyl group.

4,987,120

THERMOSENSITIVE TRANSFER MATERIAL

Hisashi Mikoshiba; Mitsugu Tanaka, and Seiiti Kubodera, all of Kanagawa, Japan, assignors to Fuji Photo Film Co., Ltd., Kanagawa, Japan

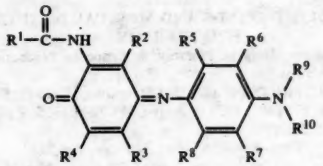
Filed Oct. 2, 1989, Ser. No. 416,207

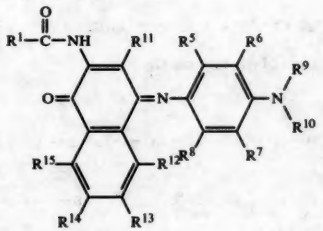
Claims priority, application Japan, Oct. 5, 1988, 63-251214

Int. Cl.[5] B41M 5/035, 5/26

U.S. Cl. 503—227 7 Claims

1. A thermosensitive transfer material comprising a support having thereon a dye donating layer containing a binder and a dye represented by formula (I) and/or (II):


(I)


(II)

wherein R^1 represents furyl, tetrahydrofuryl, pyridy, piperidyl, pyrrolyl, pyrrolidyl, tetrohydropyranyl, imidazolyl, pyrazolyl, thiazolyl, pyrazolonyl or thiodiazolyl;

R^2, R^3, R^4, R^5, R^6, R^7, R^8, R^{11}, R^{12}, R^{13}, R^{14} and R^{15}, which may be the same or different, each represents a hydrogen atom, an alkyl group, an alkoxy group, a halogen atom, an acylamino group, an alkoxycarbonyl group, a cyano group, an alkoxycarbonylamino group, an aminocarbonylamino group, a carbamoyl group, a sulfamoyl group or a sulfonylamino group;

R^9 and R^{10}, which may be the same or different, each represents a hydrogen atom, an alkyl group or an aryl group; and

at least one combination of R^6 and R^9, and R^7 and R^{10} may be combined to form a ring, or R^9 and R^{10} may be combined to form a ring.

4,987,121

ERYTHROPOIETIC FACTOR

Alex J. Baertschi, and Eero Niskanen, both of Charlottesville, Va., assignors to Center for Innovative Technology, Herndon and University of Virginia, Charlottesville, both of, Va.

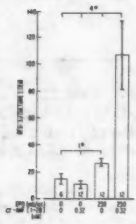
Filed May 27, 1988, Ser. No. 199,438

Int. Cl.[5] A61K 37/02

U.S. Cl. 514—8 6 Claims

1. A method for enhancing red blood cell production in a tissue, comprising the steps of adding a quantity of an atrial

natriuretic factor polypeptide and adding a quantity of erythropoietin to a tissue, said atrial natriuretic factor polypeptide



being selected from the group consisting of α-ANF[1-28], α-ANF[4-28], and α-ANF[5-28].

4,987,122

PEPTIDE COMPOUNDS AND MEDICAL METHOD OF USE THEREOF

Ole D. Laerum, Bergen, Norway, assignor to Nycomed AS, Oslo, Norway

PCT No. PCT/GB87/00784, § 371 Date Jun. 17, 1987, § 102(e) Date Jun. 17, 1987, PCT Pub. No. WO88/03535, PCT Pub. Date May 19, 1988

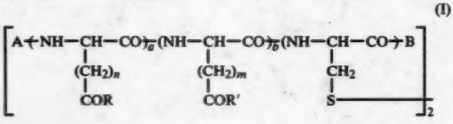
PCT Filed Nov. 5, 1987, Ser. No. 206,341

Claims priority, application United Kingdom, Nov. 6, 1986, 8626539

Int. Cl.[5] C07K *5/10, 7/06;* **A61K** *37/02*

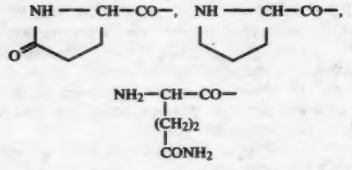
U.S. Cl. 514—15 **6 Claims**

1. Compounds of the formula (I):

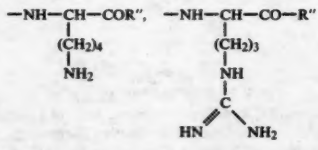


(I)

wherein all amino acid units are in the L-configuration, A represents



or a hydrogen atom; B represents



or a hydroxy group; n and m independently represent the integers 1 or 2; a and b independently represent the integers 1 or 1; R, R′ and R″ independently represent a hydroxy group or an amino group; and the physiologically acceptable salts thereof with the proviso that when A and B represent a hydrogen atom and a hydroxy group respectively, b may not represent the integer 0.

6. A method of stimulating the myelopoietic system of a human or animal subject in which an effective dose of a compound as claimed in claim 1 is administered to said subject.

4,987,123

COMPOSITIONS USEFUL FOR THE TREATMENT AND/OR PREVENTION OF HEPATIC DISORDERS, AND THEIR PHARMACEUTICAL USE

Hisanori Masaki; Kunio Torii, both of Kawasaki, and Tomio Suda, Tachidawa, all of Japan, assignors to Ajinomoto Co., Inc., Tokyo, Japan

Continuation-in-part of Ser. No. 161,139, Feb. 26, 1988, abandoned. This application Sep. 13, 1988, Ser. No. 243,610

Claims priority, application Japan, Feb. 24, 1988, 63-41368

Int. Cl.[5] A61K *37/02, 31/195*

U.S. Cl. 514—19 **17 Claims**

1. A pharmaceutical composition, comprising L-alanine and L-glutamine, wherein said L-alanine and said L-glutamine are present in a molar ratio of from 1:0.1 to 1:10, respectively.

4,987,124

METHOD FOR INHIBITING THE GROWTH OF SALMONELLA

Robert M. Speights, Arvada; Peter J. Perna, Boulder, and Steven L. Downing, Louisville, all of Colo., assignors to Coors BioTech, Inc., Westminster, Colo.

Continuation-in-part of Ser. No. 107,115, Oct. 13, 1987, Pat. No. 4,902,674. This application Nov. 8, 1989, Ser. No. 433,506

The portion of the term of this patent subsequent to Feb. 20, 2007, has been disclaimed.

Int. Cl.[5] A61K *31/70, 33/00*

U.S. Cl. 514—23 **20 Claims**

1. A method for selectively inhibiting the growth of Salmonella in a mixed microfloral population including microflora other than Salmonella, comprising introducing to said population a composition which is fermented by said other microflora at a rate competitively greater than the rate at which said composition is fermented by Salmonella.

4,987,125

ANTITHROMBOTIC ACTIVITY OF THE TRITERPENOIDS OF ILEX PUBESCENS AND THE CONVERSION METHOD OF THE TRITERPENOIDS OF ILEX PUBESCENS HAVING NO ANTITHROMBOTIC ACTIVITY INTO THE TRITERPENOIDS HAVING ANTITHROMBOTIC ACTIVITY

Yong N. Han; Byung H. Han; Soung K. Baik, and Tae H. Kim, all of Seoul, Rep. of Korea, assignors to Cheil Sugar & Co., Ltd., Seoul, Rep. of Korea

Filed Jun. 29, 1988, Ser. No. 213,232

Int. Cl.[5] A61K *31/70, 31/19*

U.S. Cl. 514—33 **7 Claims**

1. A method of preparing triterpenoids from Ilex pubescens roots, said triterpenoids exhibiting antithrombotic activity on humans or mammals, the method for preparation comprising:

(a) extracting said Ilex pubescene roots with an organic solvent by heating in a water bath to produce a first extract, said first extract including said triterpenoids which are designated as ilexoside A, ilexoside D, ilexoside E, ilexoside J, ilexoside K, and ilexoside O, said ilexosides A, D, J, K, and O having 18-α-hydroxy-20-epiursolic acid which is designated as pubescenolic acid, said ilexoside E having 24-carboxypomolic acid which is designated as pubescenic acid,

(b) isolating said ilexoside A from said first extract to produce a second extract,

(c) hydrolyzing said ilexoside E, said ilexoside K, and said ilexoside O in said second extract with an alkaline to form said pubescenic acid, said ilexoside D, said ilexoside J to produce a third extract, and

(d) isolating said pubescenic acid, said ilexoside D, and said ilexoside j from said third extract.

4,987,126

3'-DEAMINO-4'-DEOXY-4'-AMINO ANTHRACYCLINES

Alberto Bargiotti; Antonino Suarato; Pierangelo Zini; Maria Grandi, and Gabriella Pezzoni, all of Milan, Italy, assignors to Farmitalia Carlo Erba S.R.L., Milan, Italy

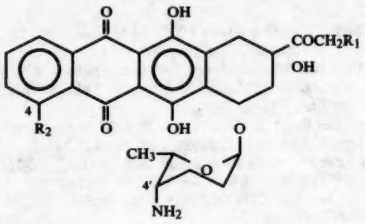
Filed Feb. 10, 1989, Ser. No. 308,449

Claims priority, application United Kingdom, Feb. 10, 1988, 8803076

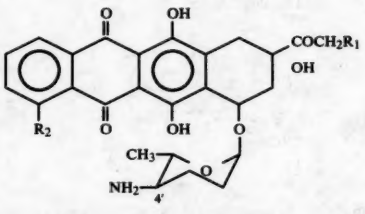
Int. Cl.[5] A61K *31/70*; C07H *15/24*

U.S. Cl. 514—34 10 Claims

1. An anthracycline glycoside of the formula I or II:



I



II

wherein R_1 is hydrogen or a hydroxy group and R_2 is hydrogen or a methoxy group; and their pharmaceutically acceptable acid addition salts.

10. A pharmaceutical composition comprising a pharmaceutically effective amount of an anthracycline glycoside of formula I or II as defined in claim 1 or a pharmaceutically acceptable salt thereof in admixture with a pharmaceutically acceptable diluent or carrier.

4,987,127

METHOD OF TREATING A VIRUS OUTBREAK

Dal Sirany, 5733 Dumas Ave., Minnetonka, Minn. 55345

Filed Jan. 31, 1989, Ser. No. 304,768

Int. Cl.[5] A01M *37/36*

U.S. Cl. 514—159 15 Claims

1. A method of treating a herpes virus outbreak at an affected area of a body surface, the method comprising:

applying an effective amount of a paste containing acetylsalicylic acid and water in a layer having a thickness of between about 0.2 mm and 10 mm over the affected area; and

maintaining the paste in contact with the affected area for a treatment period sufficient to affect development of the herpes virus outbreak.

4,987,128

NOVEL 10β-ALKYNYL-STEROIDS

Lucien Nedelec, Le Raincy; Francois Nique, Pavillons-sous-Bois, and Anne-Marie Moura, Paris, all of France, assignors to Roussel Uclaf, Paris, France

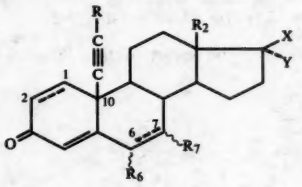
Filed Feb. 24, 1987, Ser. No. 18,199

Claims priority, application France, Feb. 24, 1986, 86 02510

Int. Cl.[5] A61K *31/58*, *31/585*; C07J *43/00*, *33/00*

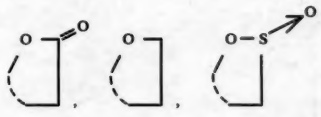
U.S. Cl. 514—175 20 Claims

1. 10β-alkynyl-steriods of the formula

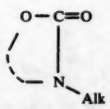


I

wherein R is selected from the group consisting of hydrogen, alkyl and alkoxy of 1 to 8 carbon atoms, alkenyl and alkynyl of 2 to 8 carbon atoms substituted alkyl of 1 to 8 carbon atoms, substituted alkenyl and alkynyl of 2 to 8 carbon atoms, said substituents being selected from the group consisting of —OH, carboxy, methoxycarbonyl, ethoxycarbonyl, amino, tritylamino, chloroacetylamino, trifluoroacetylamino, trichloroethoxycarbonylamino, methylamino, dimethylamino and halogen, unsubstituted or substituted aryl and aralkyl with at least one member of the group consisting of —OH, carboxy, methoxycarbonyl, ethoxycarbonyl, amino, methylamino, dimethylamino, methoxy, methyl and methylthio, carboxy, esterified carboxy, dialkylamino with alkyl of 1 to 6 carbon atoms, halogen and trialkylsilyl of 1 to 7 alkyl carbon atoms, R_6 and R_7 taken together with the carbon atoms to which they are attached form cyclopropyl or R_6 is hydrogen and R_7 is R_1, R_1 is selected from the group consisting of hydrogen, unsubstituted or substituted alkyl of 1 to 6 carbon atoms, unsubstituted or substituted alkenyl and alkynyl of 2 to 6 carbon atoms and acetylthio, said substituents being at least one member of the group consisting of —OH, carboxy, methoxycarbonyl, ethoxycarbonyl, amino, tritylamino, chloroacetylamino, trifluoroacetylamino, trichloroethoxycarbonylamino, methylamino, dimethylamino and halogen, R_2 is methyl or ethyl, X and Y taken together with the carbon atoms to which they are attached form a member selected from the group consisting of



and



Alk is alkyl to 12 to 8 carbon atoms the dotted lines indicate the optional presence of a second carbon-carbon bond when R_6 and R_7 and the carbon to which they are attached do not form cyclopropyl and the wavy lines indicate that R_6 and R_7 may be in the α or β position.

2. A composition having aldosterone antagonistic activity and increased hydrosodic diuresis comprising an amount of at least one compound of claim 1 sufficient to induce aldosterone

antagositic activity and hydrosodic diuresis and an inert pharmaceutical carrier.

4,987,129

CEPHALOSPORIN DERIVATIVES

Shigeo Shimizu, and Hiroyuki Takano, both of Mukawa, Japan, assignors to Sankei Pharmaceutical Co., Ltd., Tokyo and Nippon Pharmaceutical Development Institute Co., Ltd., Hokkaido, both of, Japan

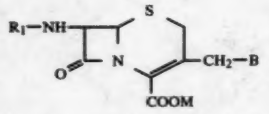
Filed Jul. 21, 1988, Ser. No. 222,404

Claims priority, application Japan, Aug. 7, 1987, 62-196178

Int. Cl.[5] C07D *501/36;* A61K *31/545*

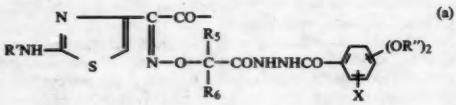
U.S. Cl. 514—206 **4 Claims**

1. A β-lactam compound represented by the formula (I):



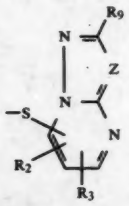
(I)

wherein R^1 represents a group represented by the formula (a):



(a)

wherein R_5 and R_6 are each independently a hydrogen atom or a lower alkyl group; R' and R'' are each independently a hydrogen atom or a protective group selected from the group consisting of a diphenylmethyl group, a t-butyl group, a p-nitrobenzyl group and a trimethyl-silyl group; and X represents a hydrogen atom, a lower alkyl group, a lower alkoxy group or a halogen atom; M represents a hydrogen atom, a protective group selected from the group consisting of diphenylmethyl group a t-butyl group, a p-nitrobenzyl group and a trimethylsilyl group or an eliminatable group which is easily hydrolyzable selected from the group consisting of an acetoxymethyl group, an α-acetoxyethyl group, a pivaroyloxymethyl group, an α-ethoxycarbonyloxethyl group, an α-methoxycarbonyloxymethyl group, an α-methoxycarbonyloxyethyl group, an α-ethoxycarbonyloxyethyl group, a 1-indanyl group, a phthalidyl group and a· 5-methyl-2-oxo-1,3-dioxol-4-ylmethyl group; B represents a group represented by the formula (b):



(b)

where at least one of R_2, R_3 and R_9 represent a group represented by the formula: —A—OR_4 where R_4 represents a hydrogen atom or a lower alkyl group; and A represents a straight or branched alkylene group having 1 to 6 carbon atoms; and a remaining group or groups are each independently a hydrogen atom; a cyano group; a lower alkyl group which may be substituted by a halogen atom; a carbamoyl group which may be substituted by a lower alkyl group; a cycloalkyl group selected from the group consisting of a cyclopropyl group, a cyclobutyl group, a cyclopentyl group and a cyclohexyl group; or a carboxyl group which may be substituted by a protective group selected from the group consisting of a diphenylmethyl group, a t-butyl group, a p-nitrobenzyl group and a trimethylsilyl group or an eliminatable group which is easily hydrolyzable selected from the group consisting of an acetoxymethyl group, an α-acetoxyethyl group, a pivaroyloxymethyl group, an α-ethoxycarbonyloxymethyl group, an α-methoxycarbonyloxymethyl group, an α-methoxycarbonyloxyethyl group, an α-ethoxycarbonyloxyethyl group, a 1-indanyl group, a phthalidyl group and a 5-methyl-2-oxo-1,3-dioxol-4-yl-methyl group; and also when R_9 is —A—OR_4, R_2 and R_3 may be combined with each other to form an alkylene group having 3 to 4 carbon atoms; and Z represents a nitrogen atom or a group represented by the formula: C—R_{10} where R_{10} represents a hydrogen atom, a carboxyl group or a lower alkyl group which may be substituted by a hydroxy group or a lower alkoxy group, or its pharmaceutically acceptable salt.

4,987,130

SUBSTITUTED AMINE DERIVATIVES, THEIR PRODUCTION AND USE

Susumu Tsushima, Osaka; Muneo Takatani, Kyoto, and Minoru Hirata, Osaka, all of Japan, assignors to Takeda Chemical Industries, Ltd., Osaka, Japan

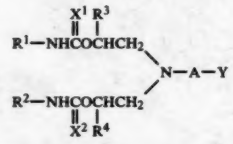
Continuation of Ser. No. 150,217, Jan. 29, 1988, abandoned. This application Dec. 22, 1989, Ser. No. 453,346

Claims priority, application Japan, Feb. 6, 1987, 62-26816; Dec. 18, 1987, 62-322510; Dec. 25, 1987, 62-331568

Int. Cl.[5] C07C *261/00;* A61K *31/395*

U.S. Cl. 514—210 **20 Claims**

1. A compound of the formula:



wherein R_1 and R^2 each stand for an alkyl group having 1 to 18 carbon atoms, an alkenyl group having 2 to 18 carbon atoms, an alkynyl group having 2 to 18 carbon atoms; a cycloalkyl group having 3 to 8 carbon atoms; a cycloalkenyl group having 5 to 8 carbon atoms; or, a fused alicyclic hydrocarbon group having 9 to 11 carbon atoms selected from the group consisting of 1-indanyl, 2-indanyl, 1,2,3,4-tetrahydro-1-naphthyl and 1,2,3,4-tetrahydro-2-naphthyl;

wherein said cycloalkyl group represented by R^1 or R^2, said cycloalkenyl group represented by R^1 or R^2 and said fused alicyclic hydrocarbon group represented by R^1 or R^2 can be substituted by one to three members of an alkyl group having 1 to 5 carbon atoms; a halogeno group; a halogenoalkyl group having 1 to 5 carbon atoms; an amino group; an N-alkylamino group having 1 to 5 carbon atoms; an N,N-dialkylamino group in which each of the alkyl moieties has 1 to 5 carbon atoms; a nitro group; a hydroxy group; an alkanoyl group having 1 to 5 carbon atoms; or, an alkoxy group having 1 to 5 carbon atoms;

R^3 and R^4 each stand for hydrogen; an alkyl group having 1 to 18 carbon atoms; an alkenyl group having 2 to 18 carbon atoms; an alkynyl group having 2 to 18 carbon atoms; a cycloalkyl group having 3 to 8 carbon atoms; a cycloalkenyl group having 5 to 8 carbon atoms; a phenyl group; a condensed polycyclic hydrocarbon group selected from the group consisting of naphthyl, phenanthrenyl, 1,2-dihydronaphthyl, 1,4-dihydronaphthyl, perhydroanthracenyl, indenyl, indanyl and acenaphthenyl; a bridged hydrocarbon group selected from the group consisting of bicyclobutanyl, bicyclooctyl, norbornyl and adamantyl; or, a monocyclic or bicyclic heterocyclic

group containing one or two hetero-atoms selected from the group consisting of nitrogen, oxygen and sulfur, wherein said heterocyclic group is selected from the group consisting of oxetanyl, thietanyl, azetidinyl, thienyl, furyl, 2H-pyrrolyl, pyrrolyl, tetrahydrofuryl, tetrahydrothienyl, pyrrolidinyl, pyranyl, oxanyl, thianyl, pyridyl, piperidinyl, oxepanyl, thiepanyl, azepinyl, dioxanyl, dithianyl, piperazinyl, morpholinyl, perhydrothiazinyl, oxathianyl, pyrazolyl, thiazolyl, isothiazolyl, oxazolyl, isooxazolyl, pyrazinyl, pyrimidinyl, pyridazinyl, imidazolyl, imidazolinyl, benzofuranyl, isobenzofuranyl, indolyl, isoindolyl, 3H-indolyl, 1H-indazolyl, chromenyl, isochromenyl, chromanyl, isochromanyl, quinolinyl, isoquinolinyl, 1-thianaphthyl, 2-thianaphthyl, 3,4-dihydro-2H-1-thianaphthyl, 3,4-dihydro-1H-2-thianaphthyl, 1,2,3,4-tetrahydroquinolyl, 1,2,3,4-tetrahydroisoquinolyl, indolinyl, isoindolinyl, quinoxalinyl, quinazolinyl and cinnolinyl;

wherein said alkyl group represented by R^3 and R^4, said alkenyl group represented by R^3 or R^4 and said alkynyl group represented by R^3 or R^4 can be substituted by one to three members of a cycloalkyl group having 3 to 8 carbon atoms; a cycloalkenyl group having 5 to 8 carbon atoms; a phenyl group; a condensed polycyclic hydrocarbon group selected from the group consisting of naphthyl, phenanthrenyl, 1,2-dihydronaphthyl, 1,4-dihydronaphthyl, perhydroanthracenyl, indenyl, indanyl and acenaphthenyl; a bridged hydrocarbon group selected from the group consisting of bicyclobutanyl, bicyclooctyl, norbornyl and adamanyl; or a monocyclic or bicyclic heterocyclic group containing one or two hetero-atoms selected from the group consisting of nitrogen, oxygen and sulfur, wherein said heterocyclic group is selected from the group consisting of oxetanyl, thietanyl, azetidinyl, thienyl, furyl, 2H-pyrrolyl, pyrrolyl, tetrahydrofuryl, tetrahydrothienyl, pyrrolidinyl, pyranyl, oxanyl, thianyl, pyridyl, piperidinyl, oxepanyl, thiepanyl, azepinyl, dioxanyl, dithianyl, piperazinyl, morpholinyl, perhydrothiazinyl, oxathianyl, pyrazolyl, thiazolyl, isothiazolyl, oxazolyl, isooxazolyl, pyrazinyl, pyrimidinyl, pyridazinyl, imidazolyl, imidazolinyl, benzofuranyl, isobenzofuranyl, indolyl, isoindolyl, 3H-indolyl, 1H-indazolyl, chromenyl, isochromenyl, chromanyl, isochromanyl, quinolinyl, isoquinolinyl, 1-thianaphthyl, 2-thianaphthyl, 3,4-dihydro-2H-1-thianaphthyl, 3,4-dihydro-1H-2-thianaphthyl, 1,2,3,4-tetrahydroquinolyl, 1,2,3,4-tetrahydroisoquinolyl, indolinyl, isoindolinyl, quinoxalinyl, quinazolinyl and cinnolinyl;

wherein cycloalkyl group, said cycloalkenyl group, said phenyl group, said condensed polycyclic hydrocarbon group, said bridged hydrocarbon group, and said monocyclic or bicyclic heterocyclic group, each represented by R^3 or R^4, or of a substituent of the alkyl, alkenyl, alkynyl group represented by R^3 or R^4, can be substituted by one to three members of an alkyl group having 1 to 5 carbon atoms; a halogeno group; a halogeno-alkyl group having 1 to 5 carbon atoms; an amino group, an N-alkylamino group having 1 to 5 carbon atoms; an N,N-dialkylamino group in which each of the alkyl moieties has 1 to 5 carbon atoms; a nitro group; a hydroxy group; an alkanoyl group having 1 to 5 carbon atoms; or, an alkoxy group having 1 to 5 carbon atoms;

A stands for an alkylene group having 2 to 12 carbon atoms; an alkenylene group having 2 to 12 carbon atoms; an alkynylene group having 2 to 12 carbon atoms; a cycloalkylene group having 3 to 8 carbon atoms; a cycloalkenylene group having 4 to 8 carbon atoms; a phenylene group; or, a group represented by the formula:

$A^1—X^3—A^2—$,

$A^3—X^3—A^2—X^4—A^3—$, or

$A^1—X^3—A^2—X^4—A^3—X^5—A^4—$

wherein X^3, X^4 and X^5 each stand for —O— or —S(O)n— in which n is 0, 1 or 2; and A^1, A^2, A^3 and A^4 each stand for an alkylene group having 2 to 12 carbon atoms, an alkenylene group having 2 to 12 carbon atoms, an alkynylene group having 2 to 12 carbon atoms, a cycloalkylene group having 3 to 8 carbon atoms, a cycloalkenylene group having 4 to 8 carbon atoms, or a phenylene group;

wherein said alkylene group, alkenylene group and alkynylene group each representing A^1, A^2, A^3 or A^4 can be substituted by one to three members of an alkyl group having 1 to 5 carbon atoms; an alkenyl group having 2 to 5 carbon atoms; an alkynyl group having 2 to 5 carbon atoms; an alkylidene group having 1 to 5 carbon atoms; an oxo group; a nitro group; a hydroxy group; an alkoxycarbonyl group having 1 to 5 carbon atoms; an amino group; an N-alkylcarbamoyloxy group in which the alkyl moiety has 1 to 5 carbon atoms; an N,N-dialkylcarbamoyloxy group in which each of the alkyl moieties has 1 to 5 carbon atoms; a halogeno group; an alkoxy group having 1 to 5 carbon atoms; a cycloalkyl group having 3 to 8 carbon atoms; an aromatic mono-, bi- or tricyclic hydrocarbon group selected from the group consisting of phenyl, naphthyl and phenanthrenyl; an alkyl group having 1 to 5 carbon atoms, which can be substituted by an aromatic mono-, bi- or tricyclic hydrocarbon group selected from the group consisting of phenyl, naphthyl and phenanthrenyl, or a monocyclic or bicyclic heterocyclic group containing one or two hetero-atoms selected from the group consisting of nitrogen, oxygen and sulfur wherein said heterocyclic group is selected from the group consisting of oxetanyl, thietanyl, azetidinyl, thienyl, furyl, 2H-pyrrolyl, pyrrolyl, tetrahydrofuryl, tetrahydrothienyl, pyrrolidinyl, pyranyl, oxanyl, thianyl, pyridinyl, piperidinyl, oxepanyl, thiepanyl, azepinyl, dioxanyl, dithianyl, piperazinyl, morpholinyl, perhydrothiazinyl, oxathianyl, pyrazolyl, thiazolyl, isothiazolyl, oxazolyl, isooxazolyl, pyrazinyl, pyrimidinyl, pyridazinyl, imidazolyl, imidazolinyl, benzofuranyl, isobenzofuranyl, indolyl, isoindolyl, 3H-indolyl, 1H-indazolyl, chromenyl, isochromenyl, chromanyl, isochromanyl, quinolinyl, isoquinolinyl, 1-thianaphthyl 2-thianaphthyl, 3,4-dihydro-2H-1-thianaphthyl, 3,4-dihydro-1H-2-thianaphthyl, 1,2,3,4-tetrahydroquinolyl, 1,2,3,4-tetrahydroisoquinolyl, indolinyl, isoindolinyl, quinoxalinyl, quinazolinyl and cinnolinyl;

wherein said cycloalkylene group, cycloalkenylene group and phenylene group each representing A^1, A^2, A^3 or A^4 can be substituted by one to three members of an alkyl group having 1 to 5 carbon atoms; a halogeno group; a halogeno-alkyl group having 1 to 5 carbon atoms; an amino group; an N-alkylamino group having 1 to 5 carbon atoms; an N,N-dialkylamino group in which each of the alkyl moieties has 1 to 5 carbon atoms; a nitro group; a hydroxy group; an alkanoyl group having 1 to 5 carbon atoms; or, an alkoxy group having 1 to 5 carbon atoms; said aromatic mono-, bi- or tricyclic hydrocarbon group, said alkyl group having 1 to 5 carbon atoms which is substituted by the aromatic mono-, bi- or tricyclic hydrocarbon residue and said monocyclic or bicyclic heterocyclic substituent of the alkylene, alkenylene or alkynylene group represented by A, A^1, A^2, A^3 or A^4 which can be substituted by one to three members of an alkyl group having 1 to 5 carbon atoms; a halogeno group; a halogeno-alkyl group having 1 to 5 carbon atoms; an amino group; an N-alkylamino group having 1 to 5 carbon atoms; an N,N-dialkylamino group in which each of the alkyl moieties has 1 to 5 carbon atoms; a nitro group; a hydroxy group; an alkanoyl group having 1 to 5 carbon atoms; or, an alkoxy group having 1 to 5 carbon atoms;

X^1 and X^2 each stand for an oxygen atom or a sulfur atom; and,

Y stands for an amino group; an alkylamino group having 1 to 5 carbon atoms; a dialkylamino group in which each of the alkyl moieties has 1 to 5 carbon atoms; a cycloalk-

ylamino group having 3 to 5 carbon atoms; a phenylamino group; a phenyl-alkylamino group in which the alkyl moiety has 1 to 5 carbon atoms; an alkoxycarbonylamino group in which the alkyl moiety has 1 to 5 carbon atoms; an alkylcarbonylamino group in which the alkyl moiety has 1 to 5 carbon atoms; a benzamido group; an N'-alkylureido group in which the alkyl moiety has 1 to 5 carbon atoms; an N'-phenylureido group; an N'-phenylalkylureido group in which the alkyl moiety has 1 to 5 carbon atoms; a dialkylaminoethyloxycarbonylamino group in which the alkyl moiety has 1 to 5 carbon atoms; an alpha-aminoalkanoylamino group in which the alkanoyl moiety has 1 to 5 carbon atoms; an alpha-amino-phenylalkanoylamino group in which the alkanoyl moiety has 1 to 5 carbon atoms; a beta-aminoalkanoylamino group in which the alkanoyl moiety has 2 to 5 carbon atoms; a gamma-amino-alkanoylamino group in which the alkanoyl moiety has 3 to 5 carbon atoms; a succinimido, phthalimido or a monocyclic or condensed bicyclic heterocyclic ring selected from the group consisting of 1-azetidinyl, 1-pyrrolidinyl, piperidine, 1-piperaazinyl, perhydroazepin-1-yl, morpholino, perhydro-1, 4-thiazin-4-yl, 1-pyrrolinyl, 1-pyrazolyl, 1-pyrrolyl, perhydro-1,4-oxazepin-4-yl, perhydro-1,4-thiazepin-4-yl, perhydro-1,4-diazepin-1-yl, 1,2,3,4-tetrahydroisoquinolin-2-yl, 1,2,3,4-tetrahydroquinolin-1-yl, 1-indolinyl and 2-isoindolinyl;

wherein said monocyclic or condensed bicyclic heterocyclic ring represented by Y can be substituted by one to three members of an alkyl group having 1 to 5 carbon atoms; a halogeno group; a halogeno-alkyl group having 1 to 5 carbon atoms; an amino group, an N-alkylamino group having 1 to 5 carbon atoms; an N,N-dialkylamino group in which each of the alkyl moieties has 1 to 5 carbon atoms; a nitro group; a hydroxy group; an alkanoyl group having 1 to 5 carbon atoms; or, an alkoxy group having 1 to 5 carbon atoms; and,

wherein Y can form, in combination with a carbon atom constituting A, a monocyclic or condensed bicyclic heterocyclic ring selected from the group consisting 2- or 3-azetidinyl, 2- or 3-pyrrolidinyl, 2-, 3- or 4-piperidinyl, 2- or 3-piperazinyl, perhydroazepin-2-, -3-, or -4-yl, 2- or 3-morpholinyl, perhydrothiazin-2-, or -3-yl, 2-, 3-, 4- or 5-pyrrolinyl, 3-, 4- or 5-pyrazolyl, 2- or 3-pyrrolyl, perhydro-1,4-oxazepin-2-, -3-, -5-, -6- or -7-yl, perhydro-1,4-thiazepin-2-, -3-, -5-, -6- or -7-yl, perhydro-1,4-diazepin-2-, -3-, -5-, -6- or 7-yl, 1,2,3,4-tetrahydroquinolin-2-, -3-, -4-, -5-, -6-, -7- or -8-yl, 2-, 3-, 4-, 5-, 6- or 7-indolinyl, 1-, 3-, 4- or 5-isoindolinyl, 2-, 3- or 4-pyridyl, 2- or 3-pyrazinyl, 2-, 4- or 5-oxazolyl, 2-, 4- or 5-thiazolyl, 2-, 3-, 4-, 5-, 6-, 7- or 8-quinolyl and 1-, 3-, 4-, 5-, 6-, 7- or 8-isoquinolyl; said monocyclic or condensed bicyclic heterocyclic ring formed by Y in combination with a carbon atom constituting A which can be substituted by one to three members of an alkyl group having 1 to 5 carbon atoms; a halogeno group; a halogeno-alkyl group having 1 to 5 carbon atoms; an amino group; an N-alkylamino group having 1 to 5 carbon atoms; an N,N-dialkylamino group in which each of the alkyl moieties has 1 to 5 carbon atoms; a nitro group; a hydroxy group, an alkanoyl group having 1 to 5 carbon atoms; or, an alkoxy group having 1 to 5 carbon atoms;

or a pharmaceutically acceptable salt thereof.

4,987,131

4H-TRIAZOLO[4,3-A][1,4]BENZODIAZEPINES

Francois Clemence; Odile Le Martret, both of Paris, and Francois Delevallee, Fontenay sous Bois, all of France, assignors to Roussel Uclaf, Paris, France

Division of Ser. No. 937,709, Dec. 4, 1986, abandoned. This application Mar. 8, 1990, Ser. No. 491,264

Claims priority, application France, Dec. 13, 1985, 85-18481

Int. Cl.[5] C07D *487/04;* A61K *31/55*

U.S. Cl. 514—220 **6 Claims**

1. A compound selected from the group consisting of 4,6-dimethyl-1-(4-methoxyphenyl)-4H-1,2,4-triazolo [4,3-a]benzodiazepine and its non-toxic, pharmaceutically acceptable acid addition salts.

2. A compound selected from the group consisting of 4,6-dimethyl-1-(4-chlorophenyl-4H-1,2,4-triazolo [4,3-a][1,4]benzodiazepine in racemic or optically active form and its non-toxic, pharmaceutically acceptable acid addition salts.

4,987,132

SATURATED HETEROCYCLIC CARBOXAMIDE DERIVATIVES

Toshiyasu Mase, Chiba; Hiromu Hara, Saitama; Hitoshi Nagaoka, Tokyo; Takumi Takahashi, Tokyo; Takeshi Suzuki, Tokyo; Kenichi Tomioka, Saitama, and Toshimitsu Yamada, Tokyo, all of Japan, assignors to Yamanouchi Pharmaceutical Co., Ltd., Tokyo, Japan

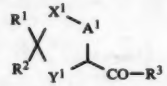
Continuation-in-part of Ser. No. 157,406, Feb. 17, 1988, abandoned. This application Aug. 16, 1988, Ser. No. 232,899

Claims priority, application Japan, Feb. 20, 1987, 62-36950; May 21, 1987, 62-125259; Oct. 1, 1987, 62-249499

Int. Cl.[5] A61K *31/495;* C07D *417/04*

U.S. Cl. 514—252 **17 Claims**

1. A saturated heterocyclic carboxamide compound of the formula (I) or a pharmaceutically acceptable salt thereof:



(I)

wherein R^1 represents a substituted or unsubstituted 5- or 6-membered heterocyclic group wherein the hetero atom is at least one member selected from the group consisting of oxygen, sulfur and nitrogen, which may be condensed with a benzene ring; R^2 represents a hydrogen atom, a lower alkyl group, or an R^1 group defined above; X^1 represents an oxygen atom, a sulfur atom, or a methylene group, which may be substituted by a lower alkyl group; Y^1 represents an oxygen atom, a sulfur atom, or a group of the formula $>N—R^4$, wherein R^4 is a hydrogen atom, a lower alkyl group, a carboxyl group, an acyl group or a lower alkoxycarbonyl group; A^1 represents a methylene group or an ethylene group, each of which may be substituted by a lower alkyl group; R^3 represents a group of the formula

in which:

A^2 and A^3, which may be the same or different, each represents a lower alkylene group containing 1 to 3 carbon atoms, Z is a nitrogen atom and R^7 is a hydrogen atom, a substituted or unsubstituted hydrocarbon group or a carboxyl, acyl, lower alkoxycarbonyl, carbamoyl, or mono- or di-lower alkylaminocarbonyl group, wherein substituents on said heterocyclic and hydrocarbon groups are selected from the group consisting of halo, lower alkyl, hydroxy, mercapto, alkoxy, lower alkylthio, cycloalkyl-lower alkoxy, cycloalkyl-lower alkylthio, aryl, aralkyloxy, aralkylthio, aryloxy, arylthio, arylsulfinyl, arylsulfonyl, aryloxy-lower alkoxy, aryloxy-lower alkylthio, arylthio-lower alkoxy, arylthio-lower alkylthio, oxo, thioxo, carboxyl, lower alkoxycarbonyl, acyl, cyano, carbamoyl, mono- or di-lower alkylaminocarbonyl, nitro, amino, mono- or di-lower alkylamino, mono-or diaralkylamino and N-aralkyl-N-lower alkylamino, and wherein said cycloalkyl contains 3 to 7 carbon atoms and said aryl is phenyl or naphthyl.

4,987,133

SALICYLIC ACID DERIVATIVES

Hans-Adolf Kurmeier, Seeheim-Jugenheim; Wolf-Dietrich Weber, Reinheim; Hans-Eckart Radunz, Mühltal, and Hans-Jochen Schliep, Traisa, all of Fed. Rep. of Germany, assignors to Merck Patent Gesellschaft Mit Beschrankter Haftung, Darmstadt, Fed. Rep. of Germany

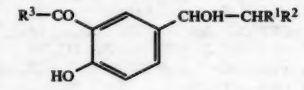
Filed Apr. 17, 1989, Ser. No. 338,822

Claims priority, application Fed. Rep. of Germany, Apr. 16, 1988, 3812755

Int. Cl.[5] A61K *31/495, 31/55;* C07D *417/04, 405/04*

U.S. Cl. 514—252 14 Claims

1. A salicylic acid derivative of the formula I



I

wherein

R^1 is H or CH_3,

R^2 is 4-(4-methyl-2-thiazolyl)-piperazino, 4-(tetrahydro-2-furoyl)-piperazino, or 4-(4-methyl-2-thiazolyl)-homopiperazino, and

R^3 is alkoxy having 1–4 C atoms, NH_2 or alkylamino having 1–4 C atoms; or a physiologically acceptable acid addition salt thereof.

4,987,134

THIENYLPIPERAZINES, THE USE THEREOF AND PHARMACEUTICALS CONTAINING THESE

Karl Schönafinger, Alzenau; Rudi Beyerle, Frankfurt; Ursula Schindler, Mörfelden-Walldorf; Bernd Jablonka, Oberursel, all of Fed. Rep. of Germany, and Jeffery Troke, Pagnell, England, assignors to Cassella Aktiengesellschaft, Frankfurt, Fed. Rep. of Germany

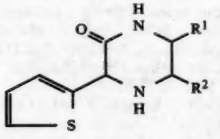
Filed Mar. 16, 1990, Ser. No. 494,606

Claims priority, application Fed. Rep. of Germany, Mar. 22, 1989, 3909379

Int. Cl.[5] A61K *31/495;* C07D *409/04*

U.S. Cl. 514—252 5 Claims

1. Thienylpiperazines of the general formula I



(I)

in which R^1 denotes hydrogen or double-bonded oxygen and R^2 denotes hydrogen or double-bonded oxygen, with R^1 and R^2 not both having the same meaning, as well as the pharmaceutically tolerated salts thereof.

5. Pharmaceutical composition comprising as active compound one or more thienylpiperazine derivatives according to claim 1 or a pharmaceutically tolerated salt thereof together with a pharmaceutically acceptable vehicle and optionally pharmaceutically acceptable additives.

4,987,135

SUBSTITUTED BENZENE DERIVATIVES, PROCESSES FOR THEIR PRODUCTION AND ANTITUMOR COMPOSITIONS CONTAINING THEM

Takahiro Haga; Nobutoshi Yamada; Hideo Sugi; Toru Koyanagi, and Hiroshi Okada, all of Kusatsu, Japan, assignors to Ishihara Sangyo Kaisha Ltd., Osaka, Japan

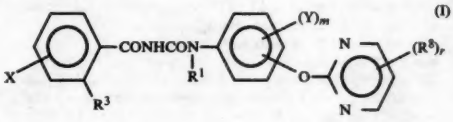
Filed Mar. 16, 1989, Ser. No. 324,559

Claims priority, application Japan, Mar. 31, 1988, 63-79658; Feb. 14, 1989, 63-34487

Int. Cl.[5] A61K *31/505;* C07D *239/34, 401/12, 403/12*

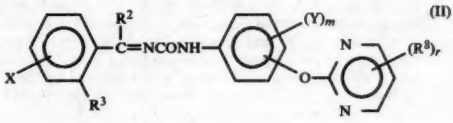
U.S. Cl. 514—274 12 Claims

1. A compound of the formula



(I)

or



(II)

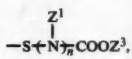
or a salt thereof

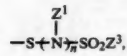
wherein:

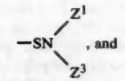
X is selected from the group consisting of hydrogen, halogen and nitro;

R_1 is selected from the group consisting of

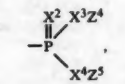
$-X^1Z^1$,







, and



,

wherein each of Z^1, Z^3, Z^4 and Z^5 is independently selected from the group consisting of alkyl of 1 to 11 carbon atoms, substituted alkyl of 1 to 11 carbon atoms, alkenyl of 2 to 6 carbon atoms, substituted alkenyl of 2 to 6 carbon atoms, alkynyl of 2 to 6 carbon atoms, substituted alkynyl of 2 to 6 carbon atoms, phenyl, substituted phenyl, naphthyl, substituted naphthyl, thienyl, substituted thienyl, furyl, substituted furyl, pyranyl, substituted pyranyl, pyridinyl, substituted pyridinyl, pyrimidinyl, substituted pyrimidinyl, quinolyl, substituted quinolyl, quinoxalinyl, and substituted quinoxalinyl; and

each of X^1, X^2, X^3 and X^4 is independently selected from the group consisting of oxygen and sulfur;

R^2 is selected from the group consisting of $-OZ^1$ and $-SZ^1$, wherein Z^1 is as defined above;

R^3 is selected from the group consisting of nitro, dialkyl-

amino wherein each alkyl has from 1 to 6 carbon atoms, morpholino, aziridinyl, pyrrolidinyl and piperidino;

Y is selected from the group consisting of halo, alkyl of 1 to 11 carbon atoms, substituted alkyl of 1 to 11 carbon atoms, alkoxy of 1 to 11 carbon atoms, substituted alkoxy of 1 to 11 carbon atoms, alkylthio of 1 to 11 carbon atoms, substituted alkylthio of 1 to 11 carbon atoms, nitro or

wherein R^6 and R^7 are independently from the group consisting of alkyl of 1 to 11 carbon atoms and substituted alkyl of 1 to 11 carbon atoms;

m is an integer from 1 to 4, inclusive;

n is zero or 1; and

$(R^5)_4$ is selected from 1 to 3 halo, nitro or C_1–C_{11}-alkyl substituents or a single substituent defined above for Y other than halo, nitro or alkyl, located at the 5-position of the pyrimidine ring;

and the substituents of the substituted alkyl, alkenyl, alkynyl, phenyl, naphthyl, thienyl, furyl, pyranyl, pyridinyl, pyrimidinyl, quinolyl and quinoxalinyl, groups in the definitions of Z^1, Z^3, Z^4 and Z^5 are selected from the group consisting of halo, nitro, cyano, alkyl of 1 to 11 carbon atoms, haloalkyl of 1 to 11 carbon atoms, alkenyl of 2 to 6 carbon atoms, haloalkenyl of 2 to 6 carbon atoms, alkynyl of 2 to 6 carbon atoms, haloalkynyl of 2 to 6 carbon atoms, cycloalkyl of 3 to 6 carbon atoms, halocycloalkyl of 3 to 6 carbon atoms, phenyl and halophenyl, and the substituent of the substituted alkyl, the substituted alkoxy and the substituted alkylthio groups in the definitions of Y, R^6, R^7 and R^8 is a halogen atom.

11. A composition for treating leukemia or melanoma in a mammal, comprising:

a compound or its salt as defined in claim 1 in an amount sufficient to exhibit a controlling activity against leukemia or melanoma in combination with a pharmaceutically acceptable adjuvant.

4,987,136

METHOD FOR CONTROLLING GASTROINTESTINAL DYSMOTILITY

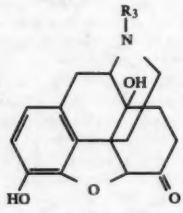
Mary J. Kreek, and Jack Fishman, both of New York, N.Y., assignors to The Rockefeller University, New York, N.Y.

Continuation of Ser. No. 680,230, Dec. 10, 1984, abandoned, which is a continuation of Ser. No. 464,110, Feb. 4, 1983, abandoned, which is a continuation-in-part of Ser. No. 358,820, Mar. 16, 1982, abandoned. This application Feb. 12, 1986, Ser. No. 828,533

Int. Cl.[5] A61K *31/44*

U.S. Cl. 514—282 **24 Claims**

1. A method for the relief of gastrointestinal dysmotility in a patient afflicted with an idiopathic gastrointestinal dysmotility which comprises administration of an amount which is effective to relieve said dysmotility of a compound represented by the formula:



wherein R_3 is 3'-methyl-2-buteneyl; allyl; cyclopropylmethyl; or cyclobutylmethyl and pharmaceutically acceptable salts thereof.

4,987,137

CERTAIN 6,7,8,9-TETRAHYDROPYRIDO[1,2-α]INDOLES AND THEIR USE FOR THE TREATMENT OF CERBROVASCULAR DISORDERS

Dagmar Hoeltje, Gronau, and Dietrich Thielke, Wallenstedt, both of Fed. Rep. of Germany, assignors to Beecham Wuelfing GmbH & Co., KG, Fed. Rep. of Germany

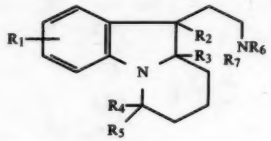
Division of Ser. No. 879,057, Jun. 26, 1986, Pat. No. 4,835,271. This application Apr. 20, 1989, Ser. No. 341,380

Claims priority, application United Kingdom, Jun. 28, 1985, 8516390; Dec. 23, 1985, 8531634

Int. Cl.[5] C07D *471/02;* A61K *31/435*

U.S. Cl. 514—294 **10 Claims**

1. A compound of formula (I) or a pharmaceutially acceptable salt thereof:



(I)

wherein:

R_1 is hydrogen, C_{1-6} alkyl, C_{1-6} alkoxy or halogen;

R_2 and R_3 are both hydrogen or together represent a bond;

R_4 is hydrogen and R_5 is hydrogen or R_4 and R_5 together represent an oxo group;

R_6 is C_{1-7} alkyl substituted by NR_8R_9 where R_8 and R_9 are independently hydrogen or C_{1-4} alkyl; and

R_7 is hydrogen or C_{1-4} alkyl.

10. A method of treatment of cerebrovascular disorders and/or disorders associated with cerebral senility in mammals, which comprises administering to the sufferer an effective amount of a compound according to claim 1.

4,987,138

ACTIVE COMPOUNDS

Frederick Cassidy, and Geoffrey Stemp, both of Harlow, England, assignors to Beecham Group p.l.c., England

Continuation of Ser. No. 905,695, Sep. 9, 1986, abandoned. This application Aug. 11, 1988, Ser. No. 231,183

Claims priority, application United Kingdom, Sep. 11, 1985, 8522492; Sep. 18, 1985, 8523051

Int. Cl.[5] A61K *31/35, 31/40, 31/445;* C07D *311/58*

U.S. Cl. 514—320 **16 Claims**

12. A compound selected from the group consisting of trans-6-cyano-3,4-dihydro-2,2-dimethyl-4-[N,N-dimethyl-2-acetamido]-2H-1-benzopyran-3-ol,

3,4-dihydro-2,-dimethyl-3-hydroxy-4-[2-oxo-2-(1-piperidinyl-)ethyl]-2H-1-benzopyran-6-carbonitrile,

6-cyano-3,4-dihydro-3-hydroxy-N-methyl-2,2-dimethyl-2H-1-benzopyran-4-acetamide,

trans-6-cyano-3,4-dihydro-2,2-dimethyl-4-acetonyl-2H-benzopyran-3-ol and trans-6-aminocarbonyl-3,4-dihydro-2,2-dimethyl-4-acetonyl-2H-1-benzopyran-3-ol.

4,987,139

FK-520 MICROBIAL TRANSFORMATION PRODUCT

Shieh-Shung T. Chen, Morganville; Linda S. Wicker, Westfield, and Byron H. Arison, Watchung, all of N.J., assignors to Merck & Co., Inc., Rahway, N.J.

Filed May 5, 1989, Ser. No. 348,243
Int. Cl.[5] A61K *31/445;* C07D *498/16*
U.S. Cl. 514—321 4 Claims

1. An immunosuppressant, designated as L-687,795, which exhibits: positive inhibition of T-cell activation by the T-cell proliferation assay, a proton nuclear magnetic spectrogram as depicted in FIG. 1, and a molecular weight of 749 as determined by FAB mass spectroscopy.

4. A method of use for treating a human host to prevent transplantation rejection, or for treating autoimmune disease or infectious disease comprising administering to said host a therapeutically effective amount of L-687,795.

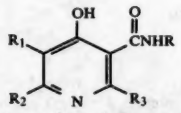
4,987,140

PYRIDINES

Francois Clemence, Paris; Odile Le Martret, both of Paris, and Francoise Delevallee, Fontenay-sous-Bois, all of France, assignors to Roussel Uclaf, Paris, France

Division of Ser. No. 167,375, Mar. 31, 1988, Pat. No. 4,925,859. This application Nov. 27, 1989, Ser. No. 441,317
Claims priority, application France, Mar. 13, 1987, 87 03465
Int. Cl.[5] C07D *401/12, 213/56;* A61K *31/505, 31/44*
U.S. Cl. 514—335 15 Claims

1. A compound selected from the group consisting of pyridines of the formula



I

wherein R is selected from the group consisting of phenyl, pyridinyl, oxazolyl, isoxazolyl, imidazolyl, pyrimidyl or tetrazolyl substituted with alkyl of 1 to 5 carbon atoms, R_1 and R_2 are individually selected from the group consisting of (a) alkyl of 1 to 5 carbon atoms and (b) phenyl and naphthyl unsubstituted or substituted with at least one member of the group consisting of hydroxy, alkyl and alkoxy of 1 to 5 carbon atoms, halogen, $—NO_3$ and $—CF_3$, R_3 is selected from the group consisting of hydrogen, alkyl of 1 to 5 carbon atoms, $—(CF_2)_n—CF_3$ and

n is an integer from 0 to 4 and Alk is alkyl of 1 to 5 carbon atoms or non-toxic, pharmaceutically acceptable salts thereof.

11. A method of claim 9 wherein R_3 is $—CF_3$ or

and Alk is alkyl of 1 to 5 carbon atoms.

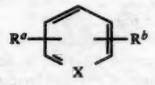
4,987,141

INSECTICIDAL COMPOUNDS AND COMPOSITIONS

Michael J. Bushell; Robin A. E. Carr, both of Wokingham; Donn W. Moseley, and Nan C. Sillars, both of Reading, all of England, assignors to Imperial Chemical Industries PLC, London, England

Filed Aug. 9, 1989, Ser. No. 391,241
Claims priority, application United Kingdom, Aug. 24, 1988, 8820115
Int. Cl.[5] A01N *43/40;* C07D *213/64*
U.S. Cl. 514—346 9 Claims

1. A compound of formula (I):



(I)

wherein X is nitrogen or carbon bearing a hydrogen atom; R^a is a group of formula $(R^1)(R^2)NS(O)_n—$ wherein R^1 and R^2 are independently selected from hydrogen, C_{1-8} alkyl, C_{1-6} haloalkyl, C_{1-6} alkoxy, C_{1-6} alkoxyalkyl, formyl, C_{2-6} alkanoyl, C_{2-8} alkenyl, C_{2-8} alkynyl, C_{3-6} cycloalkyl, C_{3-6} cycloalkylmethyl, phenyl and benzyl, and n is 0, 1 or 2; R^b is a group of formula $—OSO_2R^3$ wherein R^3 is selected from C_{1-8} alkyl, C_{1-4} alkyl substituted by a phenyl group, C_{1-8} haloalkyl, C_{2-6} alkenyl, C_{2-4} alkenyl substituted by a phenyl group, phenyl optionally substituted by methyl, trifluoromethyl or methoxy, pyridyl optionally substituted by fluorine, thienyl, and a group of formula $—N(R^4)(R^5)$ wherein R^4 and R^5 are independently selected from hydrogen and C_{1-4} alkyl; and wherein the groups R^a and R^b occupy either a 1,3 configuration relative to each other on the ring when X is carbon bearing a hydrogen, or a 2,4 or 2,6 configuration relative to the group X when X is nitrogen.

8. An insecticidal composition comprising an insecticidally effective amount of a compound as claimed in claim 1 in association with an insecticidally inert diluent or carrier.

4,987,142

FUNGICIDE COMPOSITIONS

Stanley Tocker, Wilmington, Del., assignor to E. I. du Pont de Nemours and Company, Wilmington, Del.

Filed Oct. 3, 1989, Ser. No. 438,509
Int. Cl.[5] A01N *43/64;* C07D *233/54*
U.S. Cl. 514—383 29 Claims

1. A fungicide composition having reduced eye irritation comprising in percent by weight based on the weight of the composition 5–50% of an azole fungicide which irritates the eye in combination with an aromatic hydrocarbon, 20–40% propylene glycol, 1–20% fatty alcohol having at least 10 carbon atoms, 10–40% surfactant and less than about 20% aromatic hydrocarbon.

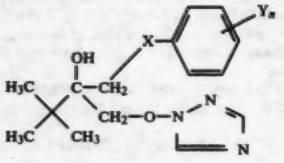
4,987,143

1-HYDROXY-1,2,4-TRIAZOLE COMPOUNDS USEFUL AS FUNGICIDES

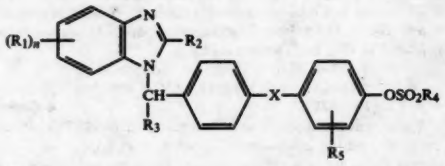
Ulf Baus, Dossenheim; Wolfgang Reuther, Heidelberg; Gisela Lorenz, Neustadt, and Eberhard Ammermann, Ludwigshafen, all of Fed. Rep. of Germany, assignors to Basf Aktiengesellschaft, Ludwigshafen, Fed. Rep. of Germany

Filed Feb. 14, 1990, Ser. No. 480,143
Claims priority, application Fed. Rep. of Germany, Mar. 3, 1989, 3906771
Int. Cl.[5] A01N *43/653;* C07D *249/08*
U.S. Cl. 514—383 4 Claims

1. A compound of the formula (I):



(I)



where

X is CH_2 or O,

Y is hydrogen, alkyl of 1 to 9 carbon atoms, C_1–C_4-alkoxy, halogen, phenyl or phenoxy, and

n is from 1 to 5, and

acid addition salts thereof, wherein the acid is selected from the group consisting of hydrochloric acid, hydrobromic acid, nitric acid, oxalic acid, acetic acid, sulfuric acid, phosphoric acid, and dodecylbenzenesulfonic acid, and

metal complexes thereof, wherein the metal is selected from the group consisting of copper, zinc, iron, maganese, and nickel.

wherein R_1 is a hydrogen atom, a halogen atom, a lower alkyl group, a lower alkoxy group or a lower alkylthio group, R_2 is a hydrogen atom, a lower alkyl group or a halo(lower)alkyl group, R_3 is a hydrogen atom or a lower alkyl group, R_4 is a lower alkyl group or a halo(lower)alkyl group, R_5 is a hydrogen atom, a halogen atom or a lower alkyl group, X is an oxygen atom, a methylene group, an imino group or a group of the formula: $—S(O)_m—$ in which m is an integer of 0 to 2 and n is an integer of 1 to 4.

5. An insecticidal or acaricidal composition which comprises as an active ingredient an insecticidally or acaricidally effective amount of the benzimidazole compound according to claim 1, and an inert carrier or diluent.

4,987,144

1,3-BIS(1,2,4-TRIAZOL-1-YL)2-(4-TRIFLUOROMETHYLPHENYL)PROPAN-2-OL USEFUL FOR THE PREVENTION AND/OR TREATMENT OF DEEP-SEATED MYCOSIS

Yoshihiko Kanamaru; Minoru Tokizawa, both of Narita; Masaru Matsumoto, Tomisato; Takemitsu Asaoka, Narita; Hideaki Matsuda, Abiko, and Tadayuki Kuraishi, Chiba, all of Japan, assignors to SS Pharmaceutical Co., Ltd., Tokyo, Japan

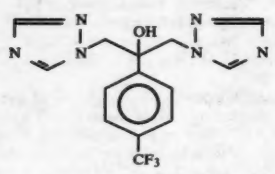
Filed Sep. 25, 1989, Ser. No. 412,152

Claims priority, application Japan, May 2, 1989, 64-113113

Int. Cl.[5] A61K *31/41;* C07D *249/08*

U.S. Cl. 514—383 3 Claims

1. 1,3-Bis(1,2,4-triazol-1-yl)-2-(4-trifluoromethylphenyl)propan-2-ol represented by the following formula (I):



(I)

4,987,145

ACARICIDAL OR INSECTICIDAL SUBSTITUTED 1-PHENYLALKYL BENZIMIDAZOLE COMPOUNDS

Hiroshi Kisida, Takarazuka; Akira Shuto, Takarazuka; Masahiro Tamaki, Takarazuka; Tomotoshi Imahase, Takarazuka, and Hiroaki Fujimoto, Toyonaka, all of Japan, assignors to Sumitomo Chemical Company, Limited, Osaka, Japan

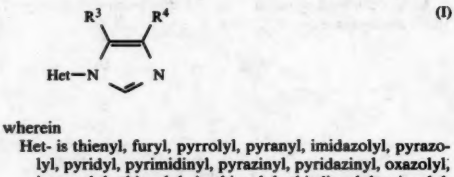
Filed Aug. 17, 1989, Ser. No. 395,057

Claims priority, application Japan, Sep. 9, 1988, 63-226792

Int. Cl.[5] A01N *43/52;* C07D *235/08*

U.S. Cl. 514—394 20 Claims

1. A benzimidazole compound of the formula:



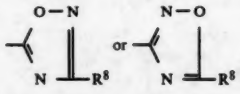
(I)

wherein

Het- is thienyl, furyl, pyrrolyl, pyranyl, imidazolyl, pyrazolyl, pyridyl, pyrimidinyl, pyrazinyl, pyridazinyl, oxazolyl, isoxazolyl, thiazolyl, isothiazolyl, thiadiazolyl, triazolyl, triazinyl, benzothiazolyl, benzimidazolyl, indolyl, benzofuranyl, benzothienyl; or one of the above substituted by one or two of halo, C_{1-6}-alkyl, C_{1-4}-alkoxy, nitro, amino, or amino substituted by one or two of C_{1-4}-alkyl or C_{2-5}-alkanoyl;

R^3 is hydrogen, C_{1-6}-alkyl, or C_{1-6}-alkoxy-alkyl,

R^4 is $—COOR^5$, $—CONR^6R^7$, —CN,



wherein

R^5 is hydrogen or C_{1-6}-alkyl, R^6 and R^7 are the same or different and are hydrogen, C_{1-7}-alkyl, C_{1-7}-cycloalkyl or, together with the nitrogen atom, are pyrrolidine, piperidine, morpholine, piperazine, or thiomorpholine, each optionally substituted with one or two C_{1-4}-alkyl groups and R^8 is hydrogen, C_{1-7}-alkyl or C_{3-7}-cycloalkyl.

10. A method of achieving an anxiolytic effect in a host,

4,987,146

N-HETARYL IMIDAZOLE DERIVATIVES

Ralph Rohde; Helmut Biere; Ralph Schmiechen; John S. Andrews, and David N. Stephens, all of Berlin, Fed. Rep. of Germany, assignors to Schering Aktiengesellschaft, Berlin and Bergkamen, Fed. Rep. of Germany

Filed Jul. 14, 1989, Ser. No. 379,844

Claims priority, application Fed. Rep. of Germany, Jul. 15, 1988, 3824658

Int. Cl.[5] A61K *31/415, 31/42, 31/425, 31/44, 31/445, 31/50, 31/505, 31/53, 31/535, 31/54;* C07D *401/04, 401/14, 403/04, 403/14, 405/04, 405/14, 409/04, 409/14, 413/04, 413/14*

U.S. Cl. 514—397 11 Claims

1. An N-hetaryl imidazole derivative of the formula

(I)

wherein

Het- is thienyl, furyl, pyrrolyl, pyranyl, imidazolyl, pyrazolyl, pyridyl, pyrimidinyl, pyrazinyl, pyridazinyl, oxazolyl, isoxazolyl, thiazolyl, isothiazolyl, thiadiazolyl, triazolyl, triazinyl, benzothiazolyl, benzimidazolyl, indolyl, benzofuranyl, benzothienyl; or one of the above substituted by one or two of halo, C_{1-6}-alkyl, C_{1-4}-alkoxy, nitro, amino, or amino substituted by one or two of C_{1-4}-alkyl or C_{2-5}-alkanoyl;

R^3 is hydrogen, C_{1-6}-alkyl, or C_{1-6}-alkoxy-alkyl,

R^4 is $—COOR^5$, $—CONR^6R^7$, —CN,

wherein

R^5 is hydrogen or C_{1-6}-alkyl, R^6 and R^7 are the same or different and are hydrogen, C_{1-7}-alkyl, C_{1-7}-cycloalkyl or, together with the nitrogen atom, are pyrrolidine, piperidine, morpholine, piperazine, or thiomorpholine, each optionally substituted with one or two C_{1-4}-alkyl groups and R^8 is hydrogen, C_{1-7}-alkyl or C_{3-7}-cycloalkyl.

10. A method of achieving an anxiolytic effect in a host,

comprising administering an effective amount of a compound of claim 1.

4,987,147

6-[P-[5-(1-IMIDAZOLYL)PENTYLOXY]PHENOXY]-2,2-DIMETHYL-HEXANOIC ACID COMPOUNDS WHICH ARE USEFUL IN TREATING TUMORS

Noriki Ito, Saitama; Yoshinobu Nagano; Akihiro Tanaka, both of Tokyo; Yoso Numasaki, Saitama, and Koichiro Takahashi, Tokyo, all of Japan, assignors to Yamanouchi Pharmaceutical Co., Ltd., Tokyo, Japan

Division of Ser. No. 74,290, Jul. 16, 1987, Pat. No. 4,891,432. This application May 9, 1989, Ser. No. 349,226

Claims priority, application Japan, Jul. 24, 1986, 61-174774

Int. Cl.[5] C07D *233/60;* A61K *31/415*

U.S. Cl. 514—399 1 Claim

1. A method of treating tumors in a patient which comprises administering to said patient an anti-tumor effective amount of a pharmaceutical composition comprised of from about 500 to about 2,000 mg of 6-[p-[5-(1-imidazolyl)pentyloxy]phenoxy]-2,2-dimethylhexanoic acid and a pharmaceutically acceptable excipient.

4,987,148

BIOCIDAL 4,5-DICHLORO-1,2-DITHIOL-3-ONE COMPOSITION

Yasuhiro Hidaka, Osaka; Masato Magami; Takeshi Inoue, both of Oita, and Sumio Nakane, Kyoto, all of Japan, assignors to Yoshitomi Pharmaceutical Industries, Ltd., Osaka, Japan

Continuation-in-part of Ser. No. 298,433, Jan. 18, 1989, abandoned. This application Oct. 19, 1989, Ser. No. 424,029

Claims priority, application Japan, Jan. 19, 1989, 63-9401

Int. Cl.[5] A01N *43/26, 43/36*

U.S. Cl. 514—441 2 Claims

1. A biocidal composition with high storability and stability, which comprises 4,5-dichloro-1,2-dithiol-3-one and N-methyl-2-pyrrolidone in a proportion by weight of 70:30 to 10:90.

4,987,149

SORAPHEN COMPOUNDS AND THEIR USE AS MICROBICIDES

Bettina Böhlendorf, Braunschweig; Norbert Bedorf, Königslutter; Gerhard Höfle; Dietmar Schummer, both of Braunschweig, all of Fed. Rep. of Germany, and Marius Sutter, Basel, Switzerland, assignors to Gesellschaft fur Biotechnologische Forschung mbh, Braunschweig, Fed. Rep. of Germany and Ciba-Geigy Corporation, Ardsley, N.Y.

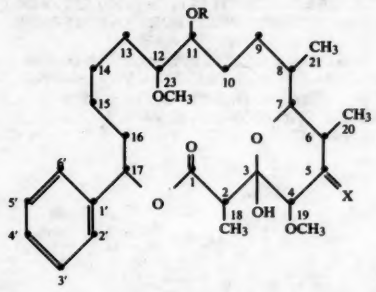
Division of Ser. No. 405,379, Sep. 8, 1989, Pat. No. 4,940,804. This application Feb. 23, 1990, Ser. No. 485,120

Claims priority, application Switzerland, Sep. 9, 1988, 3376/88

Int. Cl.[5] A01N *43/24*

U.S. Cl. 514—450 1 Claim

1. A method of controlling or preventing plant fungal diseases which comprises applying to the plant, to parts of the plant or to the locus of the plant, a fungicidally effective amount of a compound of formula I



in which the dotted line in the 9,10-position is a saturated bond or a double bond, alternatively, while

R is hydrogen, CH_3 or —COA, where

A is hydrogen, C_3–C_6cycloalkyl or C_1–C_6alkyl which is unsubstituted or substituted by halogen or C_1–C_3alkoxy, and

X is oxygen or one of the groups =N—OY or =N—N(R_1)(R_2), where

Y is hydrogen, C_1–C_6alkyl, C_3–C_6alkenyl, C_3–C_6alkynyl or an acyl group —CO—Z in which

Z is phenyl, or a C_1–C_6alkyl group which is substituted by halogen or

C_1–C_4alkoxy, or is hydrogen, C_1–C_6alkyl, C_2–C_6alkenyl or C_2–C_6alkynyl;

R_1 is hydrogen or C_1–C_6alkyl and

R_2 is hydrogen, C_1–C_6alkyl, phenyl, carbamoyl($CONH_2$), —COA or —SO_2—R_3, where

R_3 is C_1–C_6alkyl, or is phenyl which is unsubstituted or substituted by C_1–C_4alkyl;

with the proviso that R is methyl if there is a double bond in the 9,10-position.

4,987,150

AGENT FOR INHIBITING BINDING OF 5-DIHYDRO-TESTOSTERONE WITH ANDROGEN RECEPTOR AS WELL AS PROCESS FOR OBTAINING SAME

Masayasu Kurono, Mie; Hidehumi Yamakawa, Kasugai; Takuya Koshizaka, Kasugai; Takehiko Suzuki, Kasugai; Eiichi Kato, Nagoya; Takafumi Iida, Kasugai; Nobuko Ohishi, Gifu, and Kunio Yagi, Nagoya, all of Japan, assignors to Kabushiki Kaisha Vitamin Kenkyusho, Gifu, Japan

Filed Jun. 23, 1988, Ser. No. 210,489

Claims priority, application Japan, Jun. 26, 1987, 62-157605; Jul. 8, 1987, 62-168809; Dec. 8, 1987, 62-308610; Dec. 5, 1988, 63-113498

Int. Cl.[5] A61K *31/35*

U.S. Cl. 514—455 2 Claims

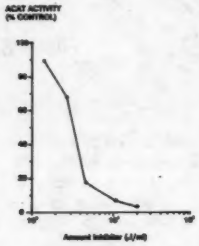
1. An anti-androgenic composition which comprises an effective amount of at least one xanthone compound selected from the group consisting of 1,3,5,8-tetrahydroxyxanthone, 1,3,6,8-tetrahydroxyxanthone, 1,4,6-trihydroxyxanthone, 1,3,5-trihydroxyxanthone, 1,3,6-trihydroxyxanthone, 1,3,8-trihydroxyxanthone, 1,3-dihydroxyxanthone, and 1,6-dihydroxyxanthone, and a pharmaceutically acceptable carrier.

4,987,151

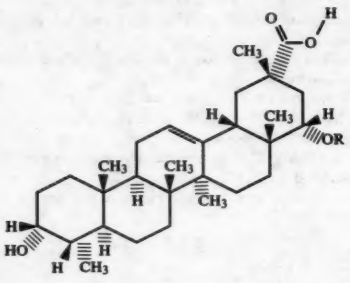
TRITERPENE DERIVATIVES CHOLESTEROL ACYLTRANSFERASE INHIBITORS AND METHODS OF USING SAME

Ira A. Tabas, New City, N.Y., assignor to The Trustees of Columbia University in the City of New York, New York, N.Y.

Filed Jun. 19, 1989, Ser. No. 367,900
Int. Cl.[5] C07C *229/00, 62/00*; A61K *31/215, 31/19*
U.S. Cl. 514—548 **24 Claims**



1. A purified compound having the structure:



wherein R may be palmitoyl or steroyl.

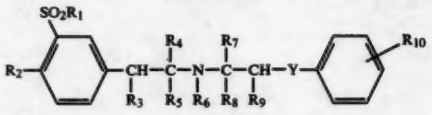
4,987,152

USE OF SULFAMOYL-SUBSTITUTED PHENETHYLAMINE DERIVATIVES IN TREATMENT OF LOWER URINARY TRACT DYSFUNCTION

Kazuo Imai; Kunihiro Niigata; Takashi Fujikura, all of Saitama, and Shinichi Hashimoto, Chiba, all of Japan, assignors to Yamanouchi Pharmaceutical Co., Ltd., Tokyo, Japan

Continuation of Ser. No. 235,689, Aug. 23, 1988, abandoned, which is a division of Ser. No. 864,431, May 16, 1986, abandoned, which is a division of Ser. No. 756,790, Jul. 18, 1985, abandoned, which is a continuation of Ser. No. 632,258, Jul. 18, 1984, abandoned, which is a continuation of Ser. No. 403,006, Jul. 29, 1982, abandoned, which is a division of Ser. No. 231,421, Feb. 4, 1981, Pat. No. 4,373,106. This application Nov. 13, 1989, Ser. No. 436,125
Claims priority, application Japan, Feb. 8, 1980, 55-14382
Int. Cl.[5] A61K *31/18*
U.S. Cl. 514—603 **1 Claim**

1. A method of treating lower urinary tract dysfunction which comprises administering the compound represented by the formula



wherein R_1 represents an amino group or a mono-or di-lower alkylamino group; R_2 represents a hydroxyl group, a lower alkyl group, or a lower alkoxy group, R_3 represents hydrogen atom, halogen atom, a lower alkyl group, a lower alkoxy group, a phenylthio group, or a phenylsulfinyl group; R_4, R_5, R_6, R_7, R_8 and R_9 each represents hydrogen atom or a lower alkyl group; R_{10} represents hydrogen atom, a lower alkyl group, or a lower alkoxy group, and Y represents an oxygen atom or a methylene group; said Y being an oxygen atom when R_2 is a hydroxyl group; or the salts thereof.

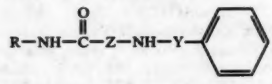
4,987,153

ALKYLAMINOAMIDE COMPOUNDS

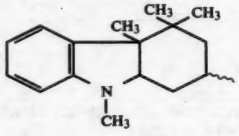
David P. Kay, Purton Swindon, and Peter D. Kennewell, Okus Swindon, both of Great Britain, assignors to Roussel Uclaf, Paris, France

Division of Ser. No. 883,914, Jul. 10, 1986, Pat. No. 4,782,075. This application Aug. 8, 1988, Ser. No. 229,922
Claims priority, application France, Jul. 15, 1985, 85 17854
Int. Cl.[5] A61K *31/165*; C07C *233/00*
U.S. Cl. 514—620 **12 Claims**

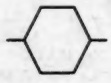
1. A compound selected from the group consisting of alkylaminoamides of the formula



wherein R is selected from the group consisting of (a) alkyl of 1 to 8 carbon atoms, (b) cycloalkyl of 3 to 7 carbon atoms unsubstituted or substituted with phenyl, (c) aryl of 6 to 14 carbon atoms unsubstituted or substituted with at least one member of the group consisting of halogen, $—CF_3$, alkyl of 1 to 6 carbon atoms, $—NO_2$ and cyclohexyl (d) aralkyl of 7 to 14 carbon atoms and (e)



Z is linear or branched alkyl of 1 to 12 carbon atoms Y is $—(CH_2)_n—$ or



and their non-toxic, pharmaceutically acceptable acid addition salts.

9. A method of treating edema and inflammation in warm-blooded animals comprises administering to warm-blooded animals an antiedematously and anti-inflammatorily effective mount of at least one compound of claim 1.

4,987,154

BIOCOMPATIBLE, STABLE AND CONCENTRATED FLUOROCARBON EMULSIONS FOR CONTRAST ENHANCEMENT AND OXYGEN TRANSPORT IN INTERNAL ANIMAL USE

David M. Long, Jr., El Cajon, Calif., assignor to Alliance Pharmaceutical Corp., San Diego, Calif.

Continuation-in-part of Ser. No. 818,690, Jan. 14, 1986, Pat. No. 4,865,836. This application Aug. 5, 1987, Ser. No. 82,846

Int. Cl.[5] A61K *47/00*

U.S. Cl. 514—772 47 Claims

1. A fluorocarbon emulsion, prepared by:

combining an aqueous phase with an effective amount of emulsifying agent and a fluorocarbon to form a mixture having from greater than 50% to about 125% weight per volume of said fluorocarbon; and

passing the fluorocarbon-containing mixture through a mechanical emulsification apparatus in which said mixture is subjected to sufficiently high flow rates and pressures to form a stable, heat sterilizable fluorocarbon-in-water emulsion;

wherein said emulsion is biocompatible and exhibits substantial particle size stability in the non-frozen state following heat sterilization.

4,987,155

FOAMABLE ORGANOPOLYSILOXANE COMPOSITION

Yoshio Inoue; Masatoshi Arai, and Tsuneo Kimura, all of Gunma, Japan, assignors to Shin-Etsu Chemical Co., Ltd., Tokyo, Japan

Filed Jul. 26, 1990, Ser. No. 557,824

Claims priority, application Japan, Jul. 26, 1989, 1-192976

Int. Cl.[5] C08J *9/02*

U.S. Cl. 521—77 10 Claims

1. A foamable organopolysiloxane composition prepared by a process comprising the steps of:

(A) blending (a) 100 parts by weight of an α,ω-dihydroxy diorganopolysiloxane represented by the general formula

$$HO—(—SiR_2—O—)_p—H,$$

in which R is, each independently from the others, an unsubstituted or substituted monovalent hydrocarbon group free from aliphatic unsaturation and the subscript p is a positive integer in the range from 200 to 3000, (b) from 10 to 80 parts by weight of a silica filler having a specific surface area of at least 50 m^2/g, (c) an organosilazane compound represented by the general formula

$$[R^1{}_3Si—(—O—SiR^1{}_2—)_q—]_2NH,$$

in which R^1 is, each independently from the others, an unsubstituted or substituted monovalent hydrocarbon group and the subscript q is zero or a positive integer not exceeding 24, in an amount in the range from 0.062 to 0.25 mole per 100 g of the silica filler as the component (b), and (d) from 0.5 to 10 parts by weight of water to effect hydrolysis of the organosilazane compound as the component (c) producing ammonia as a hydrolysis product, to give an organopolysiloxane compound;

(B) removing the ammonia from the organopolysiloxane compound obtained in step (A) by evaporation under mixing at a temperature in the range from room temperature to 200° C. until the content of the ammonia in the organopolysiloxane compound is decreased to 50 ppm by weight or smaller; and

(C) uniformly admixing the organopolysiloxane compound obtained in step (B) with (e) a polyhydroxy organopolysiloxane represented by the general formula

$$R_3Si—O—[—SiR_2—O—]_r—[—SiR(OH)—O—]_s—SiR_3,$$

in which R has the same meaning as defined above, the subscript r is a positive integer in the range from 2 to 20 and the subscript s is a positive integer in the range from 3 to 20, in an amount in the range from 0.01% to 50% by weight based on the amount of the organopolysiloxane compound obtained in step (B), (f) an organohydrogenpolysiloxane having hydrogen atoms directly bonded to the silicon atoms and having, in a molecule, at least two organosiloxane units represented by the unit formula

$$R_aH_bSiO_{(4-a-b)/2},$$

in which R has the same meaning as defined above, the subscript a is 0, 1 or 2 and the subscript b is 1, 2 or 3 with the proviso that a+b is 1, 2 or 3, in such an amount as to give from 0.5 to 30 moles of the silicon-bonded hydrogen atoms per mole of the hydroxy groups in the components (a) and (e), and (g) a platinum compound in an amount in the range from 0.1 ppm to 200 ppm by weight as platinum based on the total amount of the components (a) to (f).

4,987,156

SHOCK-ABSORBING POLYURETHANE FOAM AND PRODUCTION PROCESS THEREOF

Sigeru Tozune, Sano; Shizuo Yamazaki, Oora; Ryuichi Komori, Koga; Masashi Ishii, Wako; Yoshio Sakaguchi, Wako, and Tetsuya Oda, Wako, all of Japan, assignors to Achilles Corporation and Honda Giken Kogyo Kabushiki Kaisha, both of Tokyo, Japan

Filed Jun. 5, 1989, Ser. No. 361,290

Claims priority, application Japan, Jun. 4, 1988, 63-137650; May 18, 1989, 1-125535

Int. Cl.[5] C08G *18/14*

U.S. Cl. 521—99 23 Claims

1. A shock-absorbing polyurethane foam comprising a polyol component and a polyisocyanate component, characterized in that the polyol component is a mixed polyol having an average hydroxyl number of 130–250 and composed at least of 20–70 parts by weight of a low-molecular polyol having a molecular weight of 300–500 and 80–30 parts by weight of a high-molecular polyol having a molecular weight of 1,500–8,000 per 100 parts by weight of the whole polyol component; and the foam contains 5–150 parts by weight of a plasticizer having a solidification point not higher than −20° C. per 100 parts by weight of the whole polyol component.

4,987,157

RESINS WITH HIGH SURFACE AREAS AND POROSITIES

Bruce E. Smart, and Owen W. Webster, both of Wilmington, Del., assignors to E. I. DuPont de Nemours and Company, Wilmington, Del.

Filed Jan. 31, 1990, Ser. No. 472,997

Int. Cl.[5] C08J *9/00*

U.S. Cl. 521—50 52 Claims

1. A process for the production of a resin comprising, reacting at least one polyfunctional aryl alkali metal compound with at least one second polyfunctional monomer, and isolating an insoluble resin with a surface area of at least 100 m^2/g and a porosity of at least 20%, and wherein said resin contains less than 10 mole percent, based on the total amount of monomer, of flexiblizing groups, provided that at least 10 mole percent of the total moles of said polyfunctional aryl alkyl metal compound and said second polyfunctional monomer has a functionality of 3 or more.

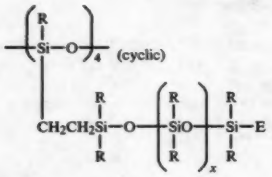
4,987,158
UV-CURABLE PRE-CROSSLINKED EPOXY FUNCTIONAL SILICONES

Richard P. Eckberg, Saratoga Springs, N.Y., assignor to General Electric Company, Waterford, N.Y.

Filed Mar. 23, 1990, Ser. No. 498,168
Int. Cl.[5] C08G *77/06, 77/04, 77/00*
U.S. Cl. 522—31 **19 Claims**

1. An ultraviolet radiation-curable composition, comprising

(A) a pre-crosslinked epoxy-functional diorganopolysiloxane having the general formula:



wherein E represents an epoxy-functional organic radical having from 2 to 20 carbon atoms; R is individually a lower alkyl radical having 1 to 8 carbon atoms; and x is a value of from 10 to about 200; and

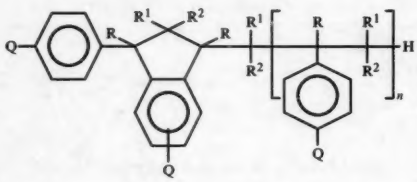
(B) a catalytic amount of an onium salt photocatalyst or a combination of onium salt photocatalysts.

4,987,159
CARBONYL DERIVATIVES OF 1-PHENYLINDAN SUITABLE FOR USE AS POLYMERIZATION PHOTOINITIATORS, THEIR PREPARATION AND USE

Giuseppe Li Bassi, Gavirate; Carlo Nicora, Varese; Fabrizio Broggi, Buguggiate, and Aldo Revelli, Cittiglio, all of Italy, assignors to Fratelli Lamberti S.p.A., Albizzate, Italy

Filed Apr. 11, 1990, Ser. No. 507,452
Int. Cl.[5] C07C *49/00*; C08F *2/50*
U.S. Cl. 522—36 **14 Claims**

1. A process for the photopolymerisation of compounds containing ethylenic double bonds, using as photoinitiator agent one or more carbonyl derivatives of 1-phenylindan having the following general formula:



where:

n: ranges from 0 to 1

R, R^1, R^2: which are identical or different, each independently represent H, C_1–C_3 alkyl

Q: represents a

group in which

R^3, R^4, which are identical or different independently represent:

C_1–C_8 alkyl

together represent a C_3–C_7 polyalkylene group

together are coincident in an oxygen atom

X: is Cl, OH, or OR in which R has the aforesaid meaning.

4,987,160
RADIATION-CURABLE AMINOAMIDE ACRYLATE POLYMER

Charles R. Frihart, Lawrenceville, N.J., and Ronald J. Wroczynski, Schenectady, N.Y., assignors to Union Camp Corporation, Wayne, N.J.

Filed Jan. 31, 1989, Ser. No. 304,760
Int. Cl.[5] C08F *283/04*; C08G *69/44*; C08L *77/00*
U.S. Cl. 522—164 **13 Claims**

1. A radiation-curable acrylate-modified aminoamide resin which comprises the Michael addition product of an aminoamide thermoplastic polymer derived from a polymerized unsaturated fatty acid with a polyol ester having a multiplicity of acrylate ester groups, the ratio of the initial acrylate groups of the polyol ester to the initial amino functional groups of the aminoamide polymer being greater than 0.5 and less than about 8.0.

4,987,161
AROMATIC COMPOSITION AND A METHOD FOR THE PRODUCTION OF THE SAME

Tohru Yamamoto, c/o Nakato Laboratory, Inc., 6, Ohshinohara, Yasu-cho, Yasu-gun, Shiga-ken, Japan

Division of Ser. No. 160,802, Feb. 26, 1988, Pat. No. 4,880,851.
This application Aug. 23, 1989, Ser. No. 397,408
Claims priority, application Japan, Feb. 4, 1987, 62-082279; Feb. 26, 1987, 62-043718; Feb. 27, 1987, 62-045462
Int. Cl.[5] B01D *13/02*
U.S. Cl. 523—102 **7 Claims**

1. A method for the production of a perfume composition comprising a perfume substance that is encapsulated or clathrated in a matrix of conjugated polymer produced from alkoxides, silane coupling agents, and organic monomers, which method comprises the steps of:

adding an acid catalyst for sol-gel methods to a reaction mixture comprising water, an alkoxide selected from the group consisting of metal alkoxides, phosphorus alkoxides, and tetraethoxysilane; a silane coupling agent selected from the group consisting of (γ-glycidoxypropyl)-trimethoxysilane, (γ-glycidoxypropyl)methyldiethoxysilane, β-(3,4-epoxycyclohexyl)ethyltrimethoxysilane, vinyltrimethoxysilane, vinyltrichlorosilane, vinyltris(β-methoxyethoxy)silane, vinyltriacetoxysilane, (γ-methacryloxypropyl)trimethoxysilane, N-β-(N-vinylbenzylaminoethyl)-γ-aminopropyltrimethoxysilane.hydrochloride, γ-aminopropyltriethoxysilane, N-phenyl-γ-aminopropyltrimethoxysilane, γ-(2-aminoethyl)amino-propyltrimethoxysilane, γ-(2-aminoethyl)amino-propylmethyldimethoxysilane, γ-mercaptopropyltrimethoxysilane, mercaptopropylmethyldimethoxysilane, methyltrimethoxysilane, methyltriethoxysilane, hexamethyldisilazane, γ-anilinopropyltrimethoxysilane, γ-chloropropyltrimethoxysilane, γ-chloropropylmethyldimethoxysilane, methyltrichlorosilane, dimethyldichlorosilane, trimethylchlorosilane, and octadecyldimethyl-(3-(trimethoxysilyl)-propyl)ammonium chloride; and a perfume substance so as to cause the hydrolysis of said alkoxide and said silane coupling agent, forming a hydrolysate;

adding an organic monomer selected from the group consisting of acrylic acid, methacrylic acid, dimethyl formamide, acrylonitrile, styrene, methyl acrylate, ethyl acrylate, methyl methacrylate and ethyl methacrylate, to the reaction mixture;

adding a base catalyst for sol-gel methods to the reaction mixture, and immediately thereafter irradiating the reaction mixture with a radiation source selected from the group consisting of ultraviolet light and an electron beam, so that the polycondensation of the hydrolysate occurs

with the polymerization of said organic monomer and the hydrolysate of said silane coupling agent to form a conjugated polymer, thereby encapsulating or clathrating said perfume substance in the matrix of said conjugated polymer.

4,987,162

SYNTHETIC ALKALI METAL ALUMINOSILICATES AND USE IN PLASTICS

Satish K. Wason, Macon, Ga., assignor to J. M. Huber Corporation, Rumson, N.J.

Filed May 31, 1990, Ser. No. 531,438

Int. Cl.[5] C08K *3/34*

U.S. Cl. 523—212 **20 Claims**

FIGURE 18: SAMS FROM EXAMPLE ONE 73,000 X

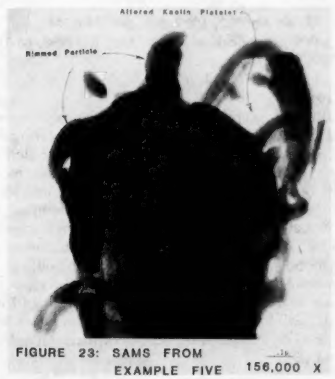


FIGURE 23: SAMS FROM EXAMPLE FIVE 156,000 X

1. A plastic composition containing an effective amount of a filler comprising an alkali metal aluminosilicate having a composition in terms of mole ratio of oxides as follows:

$$xM_2O:Al_2O_3:ySiO_2:zH_2O$$

where x is the number of moles of alkali metal oxide, M is an alkali metal, y is the number of moles of SiO_2 associated with the alkali metal aluminosilicate compositions, and z is the number of moles of bound water, and having the morphology of rimmed particles as depicted in any one of TEM FIGS. 18–23.

4,987,163

STABLE AQUEOUS EPOXY RESIN DISPERSION, PROCESS FOR THE PREPARATION THEREOF AND USE THEREOF

Wilhelm Becker, Hamburg; Claus Godau, Kiedrich, and Dieter Dreischhoff, Wiesbaden, all of Fed. Rep. of Germany, assignors to Hoechst AG, Fed. Rep. of Germany

Filed Jun. 13, 1989, Ser. No. 365,545

Claims priority, application Fed. Rep. of Germany, Jun. 15, 1988, 3820301

Int. Cl.[5] C08L *63/00*

U.S. Cl. 523—414 **27 Claims**

1. An aqueous dispersion comprising a self-emulsifying epoxy resin A) and water B), wherein the self-emulsifying epoxy resin A) has an epoxy equivalent of between 250 and 10,000 and is a condensation product of

a) 50 to 80 % by weight of an epoxy compound containing at least two epoxy groups per molecule and having an epoxy equivalent of 100 to 2,000,

b) 35 to 17 % by weight of an aromatic polyol and

c) 15 to 3 % by weight of a condensation product of an aliphatic polyol with a mean molecular weight (Mw) of 200 to 20,000, an epoxy compound containing at least two epoxy groups per molecule and having an epoxy equivalent of 100 to 2,000, and of a mono and/or polyisocyanate, the equivalent ratio of the OH groups to the epoxy groups being 1:0.85 to 1:3.5, the quantity of mono- and/or polyisocyanate being 0.05 to 5% by weight, referred to the quantity of aliphatic polyol and epoxy compound, and the epoxy equivalent of said condensation product being between 200 and at least 50,000.

4,987,164

ULTRAVIOLET LIGHT STABLE POLYMERIC COMPOSITIONS

James W. Kauffman, and Bruce R. Palmer, both of Edmond, Okla., assignors to Kerr-McGee Chemical Corporation, Oklahoma City, Okla.

Filed May 4, 1989, Ser. No. 347,191

Int. Cl.[5] C08K *3/24*

U.S. Cl. 524—413 **1 Claim**

1. The ultraviolet light stable polymeric resin compositions comprising:

a poly(vinylchloride) resin as an ultraviolet light degradable polymeric resin component; and

from about 0.1 to about 25 weight percent based on the weight of said polymeric resin of a particulate metal titanate component corresponding to the formula $M_aTi_cO_d$ wherein M is a metal selected from Groups Ia, IIa, and IIIa of the Periodic Table of the Elements, a is a number ranging from about 1 to about 2, c is a number ranging from about 1 to about 2 and d is a number ranging from about 3 to about 5, wherein both M and Ti are present in said particulate titanate in their most stable oxidation state and O is in stoichiometric balance with M and Ti such that said particulate titanate possesses a zero charge and wherein said particulate titanate further is characterized as being comprised of particles ranges in size from about 0.01 to about 10 microns in diameter and capable of absorbing ultraviolet light of wavelenghths of about 400 nm and below.

4,987,165

THERMOPLASTIC RESIN COMPOSITION AND METHOD FOR PREPARING THE SAME

Yuichi Orikasa, Yokohama, and Suchiro Sakazume, Fujisawa, both of Japan, assignors to Nippon Petrochemicals Co., Ltd. and Nippon Oil & Fats Co., Ltd., both of, Japan

Filed Sep. 28, 1989, Ser. No. 414,118
Claims priority, application Japan, Sep. 28, 1989, 63-243336
Int. Cl.[5] C08L *81/06, 63/10, 55/02*
U.S. Cl. 523—435 10 Claims

1. A thermoplastic resin composition containing

(I) 99 to 1% by weight of a polysulfone or polyether sulfone,

(II) 1 to 99% by weight of an acrylonitrile-butadiene-styrene resin,

(III) 0.1 to 100 parts by weight, based on 100 parts by weight of the aforesaid resins (I)+(II), of a multiphase structure thermoplastic resin which is composed of 5 to 95% by weight of an epoxy group-containing olefin copolymer and 95 to 5% by weight of a vinyl polymer or copolymer obtained from at least one kind of vinyl monomer, either of the polymer or copolymer being in the state of a dispersion phase having a particle diameter of 0.001 to 10 μm, and

(IV) 0 to 150 parts of an inorganic filler.

4,987,166

BITUMINOUS COMPOSITION FOR ROAD SURFACING

Carmelo Jacono, and Salvatore Tribastone, both of Ragusa, Italy, assignors to Enichem Anic S.p.A., Palermo, Italy

Continuation of Ser. No. 315,420, Feb. 24, 1989. This application Aug. 17, 1990, Ser. No. 569,406
Claims priority, application Italy, Mar. 11, 1988, 19732 A/86
Int. Cl.[5] C08L *95/00*
U.S. Cl. 524—68 7 Claims

1. a homogenous bituminous road paving composition, consisting essentially of road paving bitumen and a quantity of a mixture of thermoplastic organic polymers of from 0.5 to 20 parts by weight per 100 parts by weight of the bitumen, said mixture containing a blend of organic thermoplastic polymers consisting of from 35% to 60% by weight of polyethylene, from 5% to 10% by weight of polypropylene, from 10% to 25% by weight of polyvinylchloride, from 5% to 15% by weight of polyethyleneterphthalate and from 5% to 10% by weight of polystyrene; said blend is mixed at a temperature between 170° C. and 210° C.

4,987,167

HALOGEN-CONTAINING POLYESTER RESIN COMPOSITION AND ELECTRIC WIRE

Toshio Nakane, Fuji; Kenji Hijikata, Mishima; Makoto Iiyama, Fuji; Yukihiko Kageyama, Fujinomiya, and Michirou Naka, Fuji, all of Japan, assignors to Polyplastics Co., Ltd., Osaka, Japan

Filed Feb. 3, 1988, Ser. No. 151,802
Claims priority, application Japan, Mar. 9, 1987, 62-53717
Int. Cl.[5] C08K *5/35*
U.S. Cl. 524—95 18 Claims

1. A halogen-containing polyester resin composition, comprising:

(i) a flame retardant aromatic polyester copolymer having a halogen content of 0.5–30% by weight which is produced by a condensation polymerization reaction of the following groups:

(A) an aromatic dicarboxylic acid or an ester-forming derivative thereof,

(B) an aliphatic glycol or an ester-forming derivative thereof, and

(C) an ester-forming compound containing a halogen, and, in mixture with the polyester of group(i),

(ii) 0.1–10% by weight of a bisoxazoline compound relative to the total weight of the composition.

4,987,168

THERMOPLASTIC PLASTICIZER-CONTAINING POLYAMIDES

Franz Kerschbaumer, Chur, Switzerland, assignor to EMS-Inventa AG, Domat/Ems, Switzerland

Continuation of Ser. No. 123,936, Nov. 23, 1987, abandoned. This application Jun. 9, 1989, Ser. No. 364,252
Claims priority, application Switzerland, Nov. 25, 1986, 4709/86
Int. Cl.[5] C08K *5/29*
U.S. Cl. 524—104 21 Claims

1. A molding composition consisting essentially of at least one thermoplastic plasticizer-containing polyamide product of the polycondensation of (A) a polyamide selected from the group consisting of polycaprolactam, polyhexamethylene adipic acid amide, polyhexamethylene sebacic acid amide, polyhexamethylene azelaic acid amide, polydodecanoamide, polyundecanoamide; reaction products of adipic acid, azelaic acid, sebacic acid, dodecanedioic acid, tridecanedioic acid, terephathlic acid, and/or isophthalic acid with hexamethylene diamine, tetramethylene diamine, trimethylhexamethylene diamine, bis(4-aminocyclohexyl) methane and alkyl derivatives thereof, 2,2-bis(4-aminocyclohexyl) propane and alkyl derivatives thereof with (B) lactams, and 0.1 to 20% by weight of at least one sterically hindered carbodiimide of the formula

$$R_1—N=C=N—[R_2—N=C=N]_n—R_3$$

wherein n is 0 to 100; R_1 and R_3 are individually a monovalent radical taken from the class consisting of aliphatics having 1 to 20 carbon atoms, cycloaliphatics having 6 to 20 carbon atoms, and aromatics having 6 to 20 carbon atoms and also having substituents; and R_2 is a divalent radical taken from the class consisting of non-cyclic aliphatics having 1 to 20 carbon atoms, cycloaliphatics having 6 to 20 carbon atoms, and aromatics having 6 to 20 carbon atoms and also having substituents.

4,987,169

METHOD OF PREPARING SILICON COMPOSITIONS

Satoshi Kuwata; Koji Sakuta, and Shigeru Mori, all of Annaka, Japan, assignors to Shin-Etsu Chemical Co., Ltd., Tokyo, Japan

Filed Apr. 21, 1989, Ser. No. 341,744
Claims priority, application Japan, Apr. 22, 1988, 63-101071; Mar. 9, 1989, 1-57378
Int. Cl.[5] C08K *5/54*
U.S. Cl. 524—267 16 Claims

1. A method of preparing a uniform silicone composition, comprising treating under the application of a shearing force a polymeric product obtained by addition polymerization of (A) on organohydrogenpolysiloxane containing in its molecule from 1.5 to 5 silicon-bonded hydrogen atoms on average, said silicon-bonded hydrogen atoms being in an amount of from 1 to 20 mol %, based on the total of the silicon-bonded hydrogen atoms and silicon-bonded organic groups in the molecule; and (B) an organopolysiloxane containing in its molecule from 1.5 to 5 silicon-bonded aliphatic unsaturated groups on average; in the presence of from 10 to 1,000 parts by weight of low-viscosity silicone oil having a viscosity of not more than 100 cSt at 25° C. based on 100 parts by weight of the total amount of said (A) and (B).

4,987,170

STYRENE RESIN COMPOSITION EXCELLENT IN SLIDING PROPERTIES

Yuzuru Ishida; Masahiro Mitsuboshi; Haruo Inoue, all of Kanagawa; Ichiro Otsuka, Tokyo, and Keiji Iio, Kanagawa, all of Japan, assignors to Mitsui Toatsu Chemicals, Inc., Tokyo, Japan

Filed Sep. 8, 1989, Ser. No. 404,628
Claims priority, application Japan, Sep. 13, 1988, 63-227501
Int. Cl.[5] C08K *5/54*
U.S. Cl. 524—267 9 Claims

1. A styrene type resin composition excellent in sliding

properties which comprises 100 parts by weight of a styrene polymer, 2.0 to 4.0 parts by weight of dimethylsilicone oil having a viscosity ranging from 5,000 to 15,000 centistokes at 25 and 0.05 to 8 parts by weight of maleic anhydride monomer or 0.05 to 50 parts by weight of a maleic anhydride-styrene copolymer containing at least 5% by weight of maleic anhydride monomer units.

4,987,171

STABILIZATION OF POLY(ETHER KETONE KETONES)

Edward G. Brugel, Wilmington, Del., assignor to E. I. Du Pont de Nemours and Company, Wilmington, Del.

Filed Aug. 28, 1989, Ser. No. 398,997
Int. Cl.[5] C08K 5/14
U.S. Cl. 524—396 5 Claims

1. A process for thermally stabilizing poly(ether ketone ketones), wherein a poly(ether ketone ketone) swollen with an organic liquid is contacted for a period of at least about 15 minutes above its glass transition temperature having the range of about 130°–140° C. with an organic hydroperoxide having a boiling point above about 130° C., thermally degradable between about 130° C. and the contacting temperature, containing at least 0.1 mg of active oxygen per gram, and made from a precursor comprising at least one benzylic or allylic hydrogen in its molecule, and separating the so-treated poly(ether ketone ketone) from the liquid.

4,987,172

FLAME-RETARDANT SYNTHETIC RESIN COMPOSITION

Ken Higashitsuji; Hiroshi Kimoto, both of Kyoto; Yasunobu Takahashi, Habikino; Teruhisa Kojima, Takarazuka, and Yutaka Nadehara, Yao, all of Japan, assignors to Marubishi Oil Chemical Co., Ltd., Osaka, Japan

Continuation-in-part of Ser. No. 102,907, Sep. 30, 1987, abandoned. This application Oct. 28, 1988, Ser. No. 264,253
Claims priority, application Japan, Jun. 5, 1987, 62-139923
Int. Cl.[5] C08K 3/32; C08L 79/04
U.S. Cl. 524—416 15 Claims

1. A flame-retardant synthetic resin composition comprising a thermoplastic resin selected from the group consisting of polyolefin, acrylonitrile-butadiene-styrene copolymer and ethylene-ethyl acrylate copolymer resins as a base polymer and, incorporated therein, (A) a polyester fiber cut into a length smaller than 10 mm and/or a polyester powder having a particle size smaller than 10 mesh and (B) a polyphosphoric acid compound having a high water resistance, wherein the amount of the thermoplastic resin is 40 to 95% by weight, the total amount of the components (A) and (B) is 5 to 60% by weight, and the component (A)/component (B) weight ratio is in the range of from 5/1 to 1/20.

4,987,173

POLYOLEFIN RESIN COMPOSITION CONTAINING FIBROUS INORGANIC FILLER

Manabu Nomura, Sodegaura; Ryuzo Tomomatsu, and Kazuaki Kihara, both of Ichihara, all of Japan, assignors to Idemitsu Petrochemical Co., Ltd., Tokyo, Japan

Continuation of Ser. No. 929,346, Nov. 12, 1986, abandoned. This application Dec. 22, 1988, Ser. No. 288,098
Claims priority, application Japan, Nov. 13, 1985, 60-252941
Int. Cl.[5] C08K 3/30, 3/22
U.S. Cl. 524—423 8 Claims

1. A polyolefin resin composition prepared by kneading a mixture comprising from 40 to 92% by weight of a polyolefin, from 5 to 30% by weight of a fibrous inorganic filler, and from 3 to 30% by weight of a thermoplastic elastomer based on the total amount of the mixture, the polyolefin being selected from the group consisting of a crystalline polypropylene, a crystalline polypropylene containing a polyethylene component, and a mixture of a crystalline polypropylene and a polyethylene, the fibrous inorganic filler having a mean fiber diameter of from 0.1 to 2 μm and an aspect ratio of from 50 to 100 and being selected from the group consisting of a magnesium hydroxide fiber, a gypsum fiber, and mixtures thereof, and the thermoplastic elastomer being selected from the group consisting of an ethylene propylene rubber, an ethylene propylene diene rubber, and a styrene butadiene rubber.

4,987,174

LOW GLOSS POLYACETAL RESIN

Edwina Ying, Bridgewater, and Conrad G. Hayes, Plainfield, both of N.J., assignors to Hoechst Celanese Corporation, Somerville, N.J.

Continuation-in-part of Ser. No. 192,633, May 11, 1988, abandoned. This application Dec. 5, 1989, Ser. No. 446,001
Int. Cl.[5] C08K 3/34
U.S. Cl. 524—444 20 Claims

1. A polyacetal resin composition which comprises a polyacetal containing —CH_2O— recurring units and aluminosilicate fibers consisting essentially of aluminosilicate with less than 5 wt. % of said aluminosilicate fiber containing oxides other than alumina and silica.

4,987,175

ENHANCEMENT OF THE MECHANICAL PROPERTIES BY GRAPHITE FLAKE ADDITION

Lee R. Bunnell, Sr., Kennewick, Wash., assignor to Battelle Memorial Institute, Richland, Wash.

Filed Nov. 21, 1988, Ser. No. 275,071
Int. Cl.[5] C08K 7/00, 3/34, 3/04
U.S. Cl. 524—449 19 Claims

1. A composition of improved strength comprising:

a polymer; and

a flake reinforcing material distributed throughout the polymer in a effective amount to significantly structurally reinforce the polymer, individual flakes of the flake reinforcing material

(a) being less than or equal to 1000 Angstrom in thickness,

(b) having an aspect ratio greater than or equal to 100, and

(c) being significantly randomly oriented throughout the polymer; the composition being of significantly higher strength than the polymer without such flake reinforcing material.

4,987,176

WOLLASTONITE-REINFORCED POLYOXYMETHYLENE MOLDING MATERIALS AND THEIR PREPARATION

Heiner Goerrissen, Ludwigshafen; Gerhard Heinz, Weisenheim; Albrecht Hilt, and Georg N. Simon, both of Limburgerhof, all of Fed. Rep. of Germany, assignors to BASF Aktiengesellschaft, Ludwigshafen, Fed. Rep. of Germany

Filed Jul. 20, 1988, Ser. No. 221,517
Claims priority, application Fed. Rep. of Germany, Jul. 28, 1987, 3724869
Int. Cl.[5] C08K 3/34
U.S. Cl. 524—456 8 Claims

1. A reinforced polyoxymethylene molding material consisting of

(A) from 95 to 50 parts by weight of one or more polyoxymethylene polymers selected from the group consisting of the polyoxymethylene homopolymers, polyoxymethylene copolymers and mixtures thereof,

(B) from 5 to 50 parts by weight of wollastonite, the number of parts by weight of components (A) and (B) summing to 100 parts by weight, and

(C) from 0 to 60 parts by weight of additives, wherein the wollastonite crystals (B) have a mean thickness equal to or smaller than 5 μm and a mean length/thickness ratio equal to or greater than 5, said reinforced polyoxymethylene molding material having been subjected to a processing temperature of 180° C. to 260° C.

4,987,177

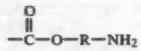
COATING COMPOSITION OF AN ACRYLIC POLYMER CONTAINING GLYCIDYL GROUPS AND ACETOACETOXY GROUPS AND AN AMINO ESTER ACRYLIC POLYMER

Herman C. Den Hartog, Rochester, and George T. Palmer, Troy, both of Mich., assignors to E. I. du Pont de Nemours and Company, Wilmington, Del.

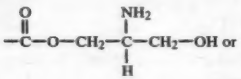
Filed Jul. 18, 1989, Ser. No. 382,351
Int. Cl.[5] C08L *37/00*
U.S. Cl. 524—517 11 Claims

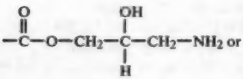
1. A coating composition comprising 20–80% by weight of a binder and 80–20% by weight of a solvent for the binder, wherein the binder consists essentially of about:

A. 60–80% by weight of the binder, of an acrylic polymer A consisting essentially of polymerized monomers of methyl metharcrylate and monomers selected from the group consisting of styrene, alkyl metharylate and alkyl acrylate each having 2–12 carbon atoms in the alkyl group and said polymer having pending from the carbon-carbon atoms of the polymer backbone reactive groups selected from the group consisting of aminoester groups of the formula

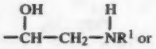


where R is an alkylene group having 2–3 carbon atoms, hydroxyaminio ester groups of the formula



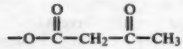


groups of the formula



where R^1 is an alkyl group of 1–8 carbons atoms; and

B. 20–40% by weight, based on the weight of the binder, of an acrylic crosslinking polymer B consisting essentially of polymerized monomers of at least 3% by weight, based on the weight of the crosslinking polymer, of a glycidyl constituent selected from the group consisting of glycidyl methacrylate and glycidyl acrylate, at least 5% by weight of analkyl acrylate or alkyl methacrylate having a pendent group of the formula



and the remainder of the monomers being selected from the group consisting of alkyl methacrylate and alkyl acrylate each having 1–12 carbon atoms in the alkyl groups; wherein said polymers A and B each have a weight average molecular weight of about 5,000–40,000 determined by gel permeation chromatography using polymethyl methacrylate as a standard.

4,987,178

CATIONICALLY ELECTRODEPOSITABLE FINELY DIVIDED GELLED POLYMER AND CATIONICALLY ELECTRODEPOSITABLE COATING COMPOSITION CONTAINING SAME

Terukazu Shibata, Hiratsuka; Akira tominaga, Chigasaki, and Tadayoshi Hiraki, Odawara, all of Japan, assignors to Kansai Paint Co., Hyogo, Japan

Filed Mar. 10, 1988, Ser. No. 166,311
Claims priority, application Japan, Mar. 11, 1987, 62-54141; Jun. 17, 1987, 62-149257
Int. Cl.[5] C08L *41/00*
U.S. Cl. 524—547 13 Claims

1. A cationically electrodepositable finely divided gelled polymer obtained by dispersing an acrylic copolymer containing a hydrolyzable alkoxysilane group and an acid-neutralized cationic group in water to form dispersed copolymer particles and crosslinking said dispersed copolymer particles.

4,987,179

PREPARATION OF POLYMER POLYOLS

W. Alexander S. Duncan, South Glamorgan, Wales, assignor to BP Chemicals Limited, London, England

Division of Ser. No. 647,040, Sep. 4, 1984, Pat. No. 4,810,750.
This application Feb. 1, 1988, Ser. No. 150,625
Int. Cl.[5] C08K *5/06*
U.S. Cl. 524—762 2 Claims

1. A process for the production of a fluid polymer polyol which process comprises polymerising styrene and acrylonitrile in a liquid polyether polyol under polymerisation conditions and in the presence of a free radical catalyst, characterised in that:

(a) the free radical catalyst is a peroxydicarbonate compound,

(b) the fluid polymer polyol produced by the process comprises a poly (acrylonitrile/styrene) copolymer and the liquid polyether polyol, the poly (acrylonitrile/styrene) copolymer containing greater than 67% and less than 90% by weight of the styrene monomer,

(c) the fluid polymer polyol comprises greater than 30% by weight of the poly (acrylonitrile/styrene) copolymer and less than 70% by weight of the liquid polyether polyol,

(d) the fluid polymer polyol has a viscosity of less than 10,000 centipoise at ambient temperature and a filterability, through a 700 mesh screen, of greater than 10% in 300 seconds, and

(e) the polyether polyol has a hydroxyl number in the range of 10 to 150.

4,987,180

SILICONE-BASED FABRIC FINISHING AGENT

Hiroyuki Ohata, Takefu; Masaki Tanaka; Hiroshi Ohashi, both of Annaka; Kiyoji Suemoto, Sabae; Hidekazu Iida, Imadate, and Hiroshi Saga, Takefu, all of Japan, assignors to Shin-Etsu Chemical Co., Ltd., Tokyo and Nissin Chemical Co.,Ltd., Takefu, both of, Japan

Filed Dec. 23, 1988, Ser. No. 288,903
Claims priority, application Japan, Dec. 23, 1987, 62-326587
Int. Cl.[5] C08L *83/04*
U.S. Cl. 524—860 16 Claims

1. A silicone-based fabric finishing agent which is an aqueous emulsion of a copolymer obtained by the emulsion polymerization of:

(A) from 5 to 95 parts by weight of an organopolysiloxane represented by the general formula

$$XO-(-SiR_2-O-)_m-(SiRY-O-)_n-X,$$

in which R is a monavalent hydrocarbon group or a halogen-substituted monovalent hydrocarbon group having 1 to 20 carbon atoms, Y is a radical-polymerizable monavalent organic group or a mercapto group-containing monavelent organic group, X is a hydrogen atom, a lower

alkyl group or an organosilyl groups of the general formula $—SiR_2R^1$, R having the same meaning as defined above and R^1 being R or Y, m is a positive integer not exceeding 10,000 and n is a positive integer, in the form of an oil-in-water emulsion; and 95 to 5 parts by weight of either

(B) an acrylic or methacrylic monomer represented by the general formula

$$CH_2=CR^1—CO—OR^2$$

in which R^1 is a hydrogen atom or a methyl group and R^2 is an alkyl group or an alkoxy-substituted alkyl group having 1 to 18 carbon atoms or a combination of component (B) and one or both of

(C) up to 10% by weight of component (B) of a polyfunctional monomer selected from the group consisting of ethylenically unsaturated amides, alkylol- or alkoxyalkyl-substituted ethylenically unsaturated amides, oxirane group-containing ethylenically unsaturated monomers, hydroxyl group-containing ethylenically unsaturated monomers, carboxyl group-containing ethylenically unsaturated monomers, esters of a polyhydric alcohol and acrylic or methacrylic acid, diallyl esters of dibasic carboxylic acids, allyl acrylate, allyl methacrylate and divinyl benzene, and

(D) up to 20% by weight of component (B) of one or more ethylenically unsaturated monomers other than components (B) and (C);

in the presence of a radical polymerization initiator.

4,987,181

SUBSTRATE WITH AN ANTITHROMOGENIC ACTIVE SURFACE

Daniel Bichon, Gaillard; Christian Guillot, Saint Julien en Genevois, both of France, and Michel Schneider, Troinex, Switzerland, assignors to Battelle Memorial Institute, Switzerland

Continuation of Ser. No. 34,162, Mar. 2, 1987, abandoned. This application Sep. 19, 1989, Ser. No. 409,988

Claims priority, application Switzerland, Jul. 8, 1985, 2954/85

Int. Cl.[5] A61K *17/00, 19/00, 29/00*

U.S. Cl. 525—54.1 **6 Claims**

1. Substrate having on at least a portion of its surface an adhesive film with antithrombogenic properties, characterized in that this film is constituted of an olefinic copolymer comprising, covalently bound to the main chain and distibuted rendomly thereon, free carboxylic side groups and groups of formula $—CONH—(CH_2)_n—NH—CH_2R$ (I) wherein R is a heparin molecule or a depolymerization fragment thereof and n is a integer from 2 to 12.

4,987,182

HYDROPHILIC POLYVINYBUTYRAL ALLOYS

Walter S. Creasy, Bridgewater, N.J., assignor to Hydromer, Inc., Whitehouse, N.J.

Division of Ser. No. 186,106, Apr. 25, 1988, Pat. No. 4,847,324. This application Feb. 23, 1989, Ser. No. 314,821

Int. Cl.[5] C08L *29/04;* **C08F** *16/06, 116/06*

U.S. Cl. 525—57 **14 Claims**

1. A stable hydrophilic coating to be applied to a substrate, said coating made with a polymer blend which comprises a first polymer component which is an organic solvent-soluble performed thermoplastic polyvinylbutyral (PVB) resin and a second polymer component which is a hydrophilic poly (N-vinyl lactam), said coating capable of withstanding exposure to water without loss of said hydrophilic poly(N-vinyl lactam).

4,987,183

CATIONIC RESIN HAVING U.V. ABSORBERS AND THE PROCESS FOR PRODUCING THE ABSORBERS

Young D. Kim, and Byung J. Ha, both of Seoul, Rep. of Korea, assignors to Pacific Chemical Co., Ltd., Seoul, Rep. of Korea

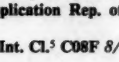
Filed Jun. 20, 1989, Ser. No. 368,704

Claims priority, application Rep. of Korea, Jun. 20, 1988, 1988-7413

Int. Cl.[5] C08F *8/30*

U.S. Cl. 525—59 **5 Claims**

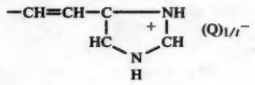
1. A novel cationic resin of the formula (I) wherein



(I)

R—O is a vinyl pyrrolidone/vinyl acetate/vinyl alcohol polymer, a vinyl pyrrolidone/vinyl alcohol polymer, a vinyl formal/vinyl alcohol/vinyl acetate polymer, or a vinyl butyral/vinyl alcohol/vinyl acetate polymer, and

R′ is a U.V. absorbing group of the formula



wherein

t is an integer which is equal to the valence of Q and

Q is chloride, bromide or iodide.

4,987,184

MIXTURES OF POLYCARBONATES WITH SILOXANE-CONTAINING GRAFT POLYMERS

Dieter Wittmann, Krefeld; Christian Lindner, Cologne; Volker Damrath, Burscheid, all of Fed. Rep. of Germany; Hans-Jürgen Kress, Pittsburgh, Pa.; Horst Peters, Leverkusen, and Jochen Schoeps, Krefeld, both of Fed. Rep. of Germany, assignors to Bayer AG, Leverkusen-Bayerwerk, Fed. Rep. of Germany

Continuation of Ser. No. 266,784, Nov. 3, 1988, Pat. No. 4,948,837. This application Mar. 20, 1990, Ser. No. 496,435

Claims priority, application Fed. Rep. of Germany, Nov. 10, 1987, 3738109

Int. Cl.[5] C08G *63/48*

U.S. Cl. 525—63 **2 Claims**

1. A thermoplastic molding composition containing:

A. 52 to 94% by weight of a component consisting of 50 to 100% by weight of a mixture of one or more polycarbonates and 0–50% by weight of a thermoplastic copolymer (C) composed of

C.1 50 to 95 parts by weight of styrene, α-methyl styrene, nucleus-substituted styrene, methyl methacrylate or mixtures thereof, and

C.2 50 to 5 parts by weight (meth)acrylo-nitrile, methyl methacrylate, maleic anhydride, N-substituted maleic imide, or mixtures thereof, the sum of the parts by weight of C.1 and C.2 amounting to 100,

B. 6 to 48% by weight of one or more particulate graft polymers wherein the graft polymers are prepared by graft polymering

B.1 20 to 90 parts by weight of a polymer graft overlay of at least one α, β-unsaturated monomer to form an overlay onto

B.2 80 to 10 parts by weight of a graft base having a core/shell structure, consisting of a core of

(a) an organic, resin-like polymer of at least one olefinically unsaturated monomer having a glass temperature (Tg) of >30° C. and a shell polymer of

(b) cross-linked silicone rubber, the ratio of the core (a) to the shell (b) being from 0.1:99.9 to 90:10, the graft polymer (B) having an average particle diameter of

from 0.05 to 10 microns and the sum of the parts by weight of B.1 and B.2 amounting to 100.

4,987,185

IMPACT RESISTANT THERMOPLASTIC RESIN COMPOSITION

Yuji Aoki, and Makoto Watanabe, both of Yokkaichi, Japan, assignors to Monsanto Kasei Company, Tokyo, Japan

Filed Jun. 13, 1989, Ser. No. 365,430
Claims priority, application Japan, Jun. 17, 1988, 63-149840
Int. Cl.[5] C08L 77/00
U.S. Cl. 525—66 12 Claims

1. An impact resistant thermoplastic resin composition having a notched Izod impact strength of at least 70 kg-cm/cm as measured at 23° C. and a notched Izod impact strength of at least 40 kg-cm/cm as measured at −20°C. which comprises:

100 parts by weight of a resin mixture comprising from 20 to 80% by weight of a polyamide resin (A) and from 20 to 80% by weight of a graft copolymer (B) composed of from 40 to 60 parts by weight of a conjugated diene rubber and from 40 to 60 parts by weight of a monomer mixture comprising from 60 to 80% by weight of an aromatic vinyl monomer component and from 20 to 40% by weight of a vinyl cyanide monomer component (provided that the total amount of said monomer mixture is 100% by weight) wherein the average particle size of conjugated diene rubber is from 0.2 to 1.0 μm, the graft ratio is from 40 to 80%, and the specific viscosity of a resinous component composed of said monomer components is from 0.05 to 0.10;

from 0.01 to 40 parts by weight of a copolymer (C) comprising from 50 to 80% by weight of an aromatic vinyl monomer component, from 0.01 to 30% by weight of an α,β-unsaturated dicarboxylic anhydride monomer component, from 5 to 47% by weight of at least one monomer component selected from the group consisting of maleimide, an N-substituted maleimide monomer component and a vinyl cyanide monomer component, and from 0 to 30% by weight of a methyl methacrylate monomer component (provided that the total amount of the monomer components is 100% by weight); and

from 0 to 15 parts by weight of a copolymer (D) comprising from 60 to 90% by weight of an aromatic vinyl monomer component, from 0 to 40% by weight of a vinyl cyanide monomer component and from 0 to 40% by weight of a methyl methacrylate monomer component (provided that the total amount of the monomer components is 100% by weight).

4,987,186

PRESSURE SENSITIVE ADHESIVE COMPOSITION

Mamoru Akiyama, Ibaraki; Takeshi Matsuyama, Takatsuki; Yoshiyuki Yanagida, Ibaraki, and Akira Yamashita, Ohmihachiman, all of Japan, assignors to Nippon Gohsei Kagaku Kogyo Kabushiki Kaisha, Osaka, Japan

Filed Dec. 21, 1988, Ser. No. 287,308
Claims priority, application Japan, Dec. 29, 1987, 62-336190
Int. Cl.[5] C08F 8/42
U.S. Cl. 525—107 6 Claims

1. A curable pressure sensitive adhesive composition comprising, (A) an acrylic copolymer component containing an acetoacetyl group, and (B) a curing component selected from the group consisting of isocyanate compounds, epoxy compounds, aldehyde compounds, non-amino resin amine compounds, metal salts, metal alkoxides, metal chelate compounds, ammonium salts and hydrazine compounds, said composition having an adhesive strength of at least 900 g/inch.

4,987,187

POLYBLENDS OF THERMOPLASTIC COPOLYESTERS AND STYRENE ACRYLONITRILE COPOLYMERS

Kishore Udipi, Longmeadow, and Allen R. Padwa, Worcester, both of Mass., assignors to Monsanto Company, St. Louis, Mo.

Filed Dec. 20, 1989, Ser. No. 453,851
Int. Cl.[5] C08L 67/02
U.S. Cl. 525—173 12 Claims

1. A thermoplastic molding composition comprising:

(a) from 95 to 65% by weight based on the total weight of (a) and (b) of a copolyester of a dicarboxylic acid moiety, at least 50 mole percent of which is terephthalic acid and a dihydric alcohol moiety, at least 50 mole percent of which is ethylene glycol, and from 20 to 50 mole percent of which is diethylene glycol or 1,4-cyclohexanedimethanol, the copolyester having a glass transition temperature (Tg) in the range of 40° to 85° C. and an inherent viscosity (I.V.) in the range of 0.2 to 10; and

(b) from 5 to 35% by weight based on the total weight of (a) and (b) of a copolymer prepared utilizing 65 to 90% by weight based on the weight of the copolymer of a styrenic monomer and 35 to 10% by weight based on the weight of the copolymer of an ethylenically unsaturated nitrile;

wherein the % Transmittance of the molding composition is 80.00 minimum.

4,987,188

IMPACT MODIFICATION OF A HEAT RESISTANT THERMOPLASTIC POLYIMIDE

John S. Furno, and E. Bruce Nauman, both of Schenectady, N.Y., assignors to General Electric Company, Pittsfield, Mass.

Filed Sep. 5, 1989, Ser. No. 402,788
Int. Cl.[5] C08L 79/08
U.S. Cl. 525—180 10 Claims

1. An impact modified polymer blend comprising a matrix of high-temperature polyetherimide with a micro-dispersion phase of about 5 to 20% by weight high temperature fluorelastomer therein, the fluorelastomer being micro-dispersed by compositional quenching and being present in substantially spherical submicron particles.

4,987,189

POLYCAPROLACTAM-BASED POLYMER COMPOSITIONS

Saverio Ruso, Genova; Giovanni C. Alfonso, Serravalle Scrivia; Enrico Pedemonte; Antonio Turturro, both of Genova, and Ezio Martuscelli, Naples, all of Italy, assignors to Consiglio Nazionale Delle Ricerche, Rome, Italy

Continuation of Ser. No. 611,119, May 17, 1984, abandoned.
This application Oct. 3, 1985, Ser. No. 783,333
Claims priority, application Italy, Jul. 6, 1983, 21950 A/83
Int. Cl.[5] C08L 77/02
U.S. Cl. 525—183 8 Claims

1. A process for preparing a biphasic polymer composition consisting essentially of a polycaprolactam phase containing a uniformly dispersed nitrile rubber phase which comprises dissolving or dispersing from 1 to 25 weight percent, based on composition weight, of nitrile rubber in liquid caprolactam at a temperature between 120° C. and 150° C., and polymerizing the caprolactam at a temperature between 120° and 180° C. in the presence of an anionic polymerization initiator.

4,987,190

SCORCH CONTROL IN THE GRAFTING OF DIACID ANHYDRIDES ONTO HIGH DENSITY POLYETHYLENE

Michael J. Keogh, Bridgewater, N.J., assignor to Union Carbide Chemicals and Plastics Company Inc., Danbury, Conn.

Filed Jun. 13, 1989, Ser. No. 365,614
Int. Cl.[5] C08F 255/02; C08L 23/26
U.S. Cl. 525—193 8 Claims

1. A process for grafting comprising introducing into a reaction zone, under grafting conditions, a composition comprising:

(i) a homopolymer or copolymer of ethylene and one or more other alpha-olefins wherein the portion of the copolymer based on ethylene is at least about 60 percent by weight based on the weight of the copolymer, said polymers having a density of at least 0.940 gram per cubic centimeter;

(ii) a homopolymer or copolymer of propylene and one or more other alpha-olefins wherein the portion of the copolymer based on propylene is at least about 60 percent by weight based on the weight of the copolymer, said homopolymer or copolymer being present in an amount of about 1 to about 60 parts by weight based on 100 parts by weight of component (i);

(iii) an anhydride of an unsaturated aliphatic diacid having 4 to 20 carbon atoms, said anhydrides being present in an amount of at least about 0.5 part by weight based on 100 parts by weight of component (i); and

(iv) a free radical initiator in an amount of at least about 0.1 part by weight based on 100 parts by weight of component (i).

4,987,191

SILK-LIKE FILM

Haruo Hayashida; Kouji Kubo; Ryouichi Nomura, and Satoru Koyama, all of Chiba, Japan, assignors to Sumitomo Chemical Co., Ltd., Osaka, Japan

Filed Jun. 22, 1989, Ser. No. 369,976
Claims priority, application Japan, Jun. 22, 1988, 63-155623
Int. Cl.[5] C08L 23/06, 23/20, 23/08, 33/12
U.S. Cl. 525—227 5 Claims

1. A silk-like polyethylene plastic film comprising an extrusion molded film of a mixture of (A) an ethylene/methacrylate copolymer having a methacrylate content of from 10 to 40 weight % and an MFR of from 0.5 to 40 g/10 min. with (B) polyethylene having an MFR of from 0.02 to 5.0 g/10 min. and a density of from 0.916 to 0.945 g/cm^3, said mixture having a methacrylate content of from 7 to 25 weight % and an MFR ratio of the component (A) to the component (B) of from 3 to 50.

4,987,192

COLORED TIRE STOCKS HAVING IMPROVED ABRASION RESISTANCE, COLOR AND COLOR STABILITY

Arthur E. Oberster, 6021 Hollydale Ave., NE., North Canton, Ohio 44721; Charles M. Roland, 324 Eutaw Forest Dr., Waldorf, Md. 20601, and Georg G. A. Bohm, 1212 Sunset View Dr., Akron, Ohio 44313

Filed May 19, 1989, Ser. No. 353,945
Int. Cl.[5] C08K 3/22, 5/09; C08L 7/00, 11/00
U.S. Cl. 525—274 19 Claims

1. A colored tire stock, other than black colored, having improved abrasion resistance, color and color stability comprising a crosslinked colored rubber composition containing from 10 to 90% of ionic crosslinks and from 90 to 10% of free radical induced covalent crosslinks.

4,987,193

PROCESS FOR PRODUCING UNSATURATED COPOLYMERS

Shiroh Gotoh, Yokkaichi, Japan, assignor to Mitsubishi Petrochemical Company Limited, Tokyo, Japan

Filed May 18, 1990, Ser. No. 524,856
Claims priority, application Japan, May 25, 1989, 64-132353
Int. Cl.[5] C08F 297/06, 297/08, 236/20
U.S. Cl. 525—313 11 Claims

1. In a process for preparing an unsaturated copolymer by the copolymerization of propylene and the branched diene which is 6-methyl-1,6-octadiene and/or 7-methyl-1,6-octadiene, and optionally, ethylene, the improvement which comprises, in a first polymerization step, the polymerization of propylene over a catalyst conducted in the presence of neither ethylene, 6-methyl-1,6-octadiene nor 7-methyl-1,6-octadiene until the propylene polymer amounts to 0.01 to 10% by weight of the total copolymer to be produced, and, in a second polymerization step, the random copolymerization of propylene, 6-methyl-1,6-octadiene and/or 7-methyl-1,6-octadiene, and optionally, ethylene conducted in the presence of said propylene polymer produced in the first polymerization step and at least a part of the activity of the catalyst used in the first polymerization step to produce a copolymer defined as follows:

(1) essentially consisting of the components of

(a) 84 to 99.5 mole % of a unit derived from propylene,

(b) 0 to 15 mole % of a unit derived from ethylene, and

(c) 0.5 to 15 mole % of a unit derived from 6-methyl-1,6-octadiene and/or 7-methyl-1,6-octadiene;

(2) soluble in decalin at 135° C. and substantially free of gel of a crosslinked polymer; and

(3) having a MFR (at 230° C. under a load of 2.16 kg) of 0.01 to 500 g/10 min.

4,987,194

BLOCK COPOLYMERS AND COMPOSITION CONTAINING THE SAME

Miduho Maeda; Hideo Takamatsu; Masao Ishii, and Shobu Minatono, all of Kashima, Japan, assignors to Kuraray Company, Limited, Kurashiki, Japan

Filed Sep. 22, 1989, Ser. No. 411,310
Claims priority, application Japan, Oct. 7, 1988, 63-254657; Nov. 16, 1988, 63-290952; May 15, 1989, 1-122655
Int. Cl.[5] C08F 297/04; B32B 15/08, 27/00
U.S. Cl. 525—314 9 Claims

1. A block copolymer having a number average molecular weight of 30,000 to 300,000 composed of at least two blocks consisting of aromatic vinyl units each having a number average molecular weight of 2,500 to 40,000 and at least one block containing a vinyl bond content of not less than 40%, having a peak temperature of primary dispersion of tan δ of at least 0° C., and consisting of isoprene or isoprene-butadiene units in which at least a portion of the carbon-carbon double bonds may be hydrogenated.

4,987,195

POLYACRYLAMIDE GELS AND METHOD FOR THE PREPARATION OF POLYACRYLAMIDE GELS

Martin Wunderling, Friedberg, and Lothar Rupp, Aldingen, both of Fed. Rep. of Germany, assignors to Hewlett-Packard Company, Palo Alto, Calif.

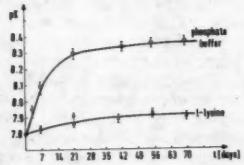
Filed Mar. 15, 1989, Ser. No. 324,290
Claims priority, application European Pat. Off., Apr. 9, 1988, 88105677.4
Int. Cl.[5] C08F 8/12, 8/30
U.S. Cl. 525—329.4 5 Claims

1. A method for preparing pH sensitive, prestabilized polyacrylamide gels having a dye indicator therein comprising the steps of:

providing a supply of a polymerizable acrylamide and a dye indicator;

combining said dye indicator and said polymerizable acryl-

amide to form a polyacrylamide gel containing said dye indicator, said polyacrylamide gel having a plurality of reactive groups thereon, said reactive groups being subject to hydrolysis during the use of said gel, said hydrolysis causing undesired intramolecular side reactions between said gel and said dye indicator, said side reactions causing a shift in the pK value of said gel over time, said shift diminishing the accuracy of said gel as a pH indicator; and



binding a chemical binding agent to said reactive groups in order to prevent said hydrolysis of said reactive groups and to prevent said intramolecular side reactions from occurring, said chemical binding agent having a pH of about 7–12 and comprising at least one alpha-amino carboxylic acid selected from the group consisting of L-histidine and L-lysine.

4,987,196

PROCESS FOR ACCELERATIVELY VULCANIZING RUBBERS WITH PROTEIN SERUM

Yoshio Tajima, Shizuoka, Japan, assignor to The Yokohama Rubber Co., Ltd., Japan

Continuation of Ser. No. 115,558, Oct. 29, 1987, abandoned, which is a continuation of Ser. No. 873,368, Jun. 12, 1986, abandoned. This application Dec. 20, 1989, Ser. No. 453,251
Claims priority, application Japan, Jun. 22, 1985, 60-136392
Int. Cl.[5] C08C *19/20*
U.S. Cl. 525—346 **7 Claims**

1. A process for accelerating the vulcanization of rubbers which consists essentially of:

(a) incorporation a vulcanizable starting natural rubber with an accelerator, said accelerator consisting of the nonrubber material separated from the serum resulting from the coagulation of, and subsequent removal of substantially all of the rubber hydrocarbons from, a natural rubber latex, said nonrubber material comprising at least proteins and amino acids occurring in said serum, and said accelerator being added in an amont of 0.5 to 10 parts per 100 parts of said starting natural rubber; and

(b) kneading and vulcanizing the resulting mixture.

4,987,197

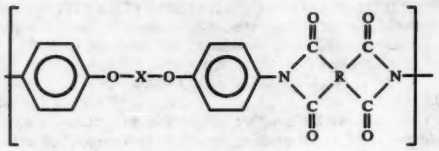
POLYIMIDE/POLYAMIDEIMIDE RESIN COMPOSITION

Masahiro Ohta, Yokohama; Saburo Kawashima, Yokosuka; Katsuaki Iiyama, Odawara; Shoji Tamai; Hideaki Oikawa, both of Yokohama, and Akihiro Yamaguchi, Kamakura, all of Japan, assignors to Mitsui Toatsu Chemicals, Inc., Tokyo, Japan

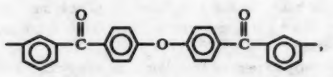
Filed Apr. 24, 1989, Ser. No. 341,810
Claims priority, application Japan, May 6, 1988, 63-109082; May 9, 1988, 63-110406
Int. Cl.[5] C08L *79/08*
U.S. Cl. 525—436 **12 Claims**

1. A polyamide resin composition comprising

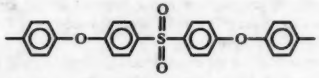
(a) from 50.0% to 99.9% by weight of a polyimide having recurring units of the formula:



wherein X is a divalent radical selected from the group consisting of a radical of the formula:

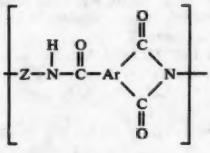


and a radical of the formula:



wherein R is a tetravalent radical selected from the group consisting of an aliphatic radical having 2 or more carbon atoms, an aliphatic radical, a monoaromatic radical, a fused polycyclic radical, and a polycyclic aromatic radical wherein aromatic radicals are linked to one another directly or via a bridge member, and

(b) from 0.1% to 50.0% by weight of an aromatic polyamideimide substantially composed of recurring units of the formula:



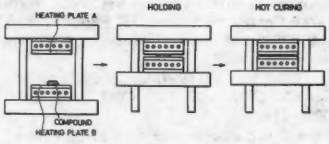
wherein Ar is a trivalent aromatic radical having one or more benzene rings, and Z is a divalent radical.

4,987,198

THERMOSETTING RESIN COMPOSITION FOR INJECTION MOLDING

Tsukuru Izukawa; Shuhei Ikado, both of Yokohama, and Toshiyuki Enomoto, Kamakura, all of Japan, assignors to Mitsui Toatsu Chemicals, Inc., Tokyo, Japan

Filed Oct. 24, 1988, Ser. No. 261,633
Int. Cl.[5] C08G *8/04, 14/04;* C08L *61/14;* C08K *5/13*
U.S. Cl. 525—491 **4 Claims**



1. A thermosetting resin composition for injection molding comprising a phenolic resin, hexamethylenetetramine, a filler, an additive and α,α′-dimethoxy-p-xylene, said resin composi-

tion having an observed curing rate of not less than 0.7 cm/sec at 170 ° C. and not more than 0.008 cm/sec at 110° C. wherein the observed curing rate is determined by the slope of the straight line portion indicating a significant change in the curing rate after the induction period on a disk cure chart showing a variation of fluidity index $\sqrt{S}$ resulting from the change of primary holding time measured by a disk cure tester at a predescribed temperature; and having an observed activation energy of at least 26 Kcal/mol wherein the observed activation energy is calculated from the Arrhenius plot of the apparent curing rate.

4,987,199

ETHYLENE-ACRYLIC ACID ESTER COPOLYMER AND PROCESS FOR PRODUCING THE SAME

Hiroyoshi Takao, Chiba; Nobuyuki Yoshida; Kiyosi Ikeda, both of Ichihara, and Masahiro Fukuyama, Chiba, all of Japan, assignors to Sumitomo Chemical Company, Limited, Osaka, Japan

Filed Sep. 22, 1988, Ser. No. 247,515
Claims priority, application Japan, Sep. 24, 1987, 62-241976
Int. Cl.[5] C08F 8/00
U.S. Cl. 525—327.3 **16 Claims**

1. An ethylene-acrylic acid ester copolymer containing a boiling xylene insoluble in an amount of 5–90% by weight, which is obtained by copolymerizing:

(A) 50–80 mole % of ethylene,

(B) 50–15 mole % of an acrylic acid ester, and

(C) 0.1–7 parts by weight, based on 100 parts by weight of the components (A) and (B), of a crosslinkable third component which is at least one member selected from the group consisting of glycidyl acrylate, glycidyl methacrylate, diglycidyl itaconate, triglycidyl butenetricarboxylate, glycidyl p-styrenecarboxylate, acrylic acid, methacrylic acid, maleic acid, a half ester of maleic acid, a monoalkyl ester of 1,4-butenedionic acid and maleic anhydride to obtain an amorphous copolymer and then subjecting the amorphous copolymer to partial crosslinking with a crosslinking agent at a high temperature of 80° C. or above while applying a shearing force.

4,987,200

PREPARATION OF POLYMER INCORPORATING MASKED FUNCTIONAL GROUP-CONTAINING MONOMERS

Sudhin Datta, Matawan, and Edward N. Kresge, Watchung, both of N.J., assignors to Exxon Chemical Patents Inc., Linden, N.J.

Filed Jun. 8, 1987, Ser. No. 59,711
Int. Cl.[5] C08F 210/02, 210/04, 210/14
U.S. Cl. 526—75 **60 Claims**

1. A method for forming a masked functionalized polymer of polymer chain monomers, said monomers selected from the group consisting of ethylene, alpha-olefins, and non-conjugated dienes, and functional group-containing monomers comprising:

(a) reacting at a temperature of less than 60° C. (i) functional group-containing monomers having a general formula of:

$$R^1—(X)_n$$

wherein R^1 comprises an ethylenically unsaturated hydrocarbyl radical, n is an integer of at least 1, and X is selected from the group consisting of carboxyl, hydroxyl, cyano, thio, amino, carbonyl and imino groups, with (ii) a masking agent comprising at least one non-halogenated metallic compound to form the corresponding masked functional group-containing monomers;

(b) reacting said masked functional group-containing monomers with a C_2–C_5 alcohol; and

(c) polymerizing in the presence of a Ziegler polymerization catalyst said polymer chain monomers with said masked functional group-containing monomers to produce a polymerization product comprising a polymer chain including masked functional group-containing monomers.

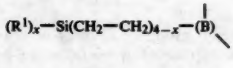
4,987,201

BORON-CARBON-SILICON POLYMERS AND THE CERAMIC THEREOF

Salvatore R. Riccitiello; Ming-ta S. Hsu, and Timothy S. Chen, all of San Jose, Calif., assignors to The United States of America as represented by the Administrator of the National Aeronautics and Space Administration, Washington, D.C.

Filed Jun. 5, 1989, Ser. No. 361,471
Int. Cl.[5] C08G 79/08
U.S. Cl. 528—4 **16 Claims**

1. A process for the production of an organoborosilicon ceramic prepolymer of the structure:



wherein R^1 is selected from alkyl having from 1 to 10 carbon atoms or phenyl, and x is selected from 0, 1, 2 or 3;

which prepolymer is pyrolyzable to produce a refractory material comprising ceramic compounds of Si, C and B, which process comprises:

contacting a silicon containing compound of the structure:

$$(R^1)_x—Si\,(CH{=}CH_2)_{4-x}$$

with a boron containing compound selected from $H_3B{:}BH_3$, $H_3B{:}NH_3$, or $BH_3{:}N(R^2)_3$ wherein R^2 is selected from methyl, ethyl, propyl, butyl, or phenyl in an inert anhydrous atmosphere at a temperature of between about 90° and 170° C. for between about 0.1 and 120 hr; and

recovering the ceramic prepolymer.

4,987,202

METHODS FOR THE SYNTHESIS OF POLYSILANES

John M. Zeigler, #421 2208 Lester Dr., NE., Albuquerque, N. Mex. 87112

PCT No. PCT/US87/00850, § 371 Date Oct. 14, 1988, § 102(e) Date Oct. 14, 1988
Continuation of Ser. No. 851,713, Apr. 14, 1986, abandoned.
This PCT application Apr. 14, 1987, Ser. No. 327,195
Int. Cl.[5] C08G 77/00
U.S. Cl. 528—10 **33 Claims**

1. A method of controlling the yield of polysilane of a desired molecular weight and/or polydispersity prepared in a reductive condensation polymerization of the corresponding silane monomers on a solid surface-reacting agent which is effective to polymerize said monomers and is dispersed in an inert solvent for both the monomers and the growing polymer chains,

comprising determining the functional dependence of molecular weight and/or polydispersity of said polysilane as a function of the compatibility of said polysilane with reaction solvent, determining therefrom an optimum degree of the compatibility of said polysilane in reaction solvent which optimizes the yield of polysilane of said desired molecular weight and/or polydispersity, and thereafter preparing said polysilane by carrying out the reductive condensation polymerization in a particular reaction solvent in which said polysilane has said chosen optimum degree of compatibility.

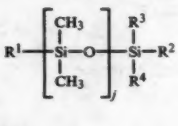
4,987,203

POLYORGANOSILOXANE COMPOUNDS WITH EPOXY GROUP

Takahiro Saho; Yoshinori Akutsu; Takaharu Nakano, and Nobumasa Ohtake, all of Yokohama, Japan, assignors to Chisso Corporation, Japan

Filed Oct. 24, 1989, Ser. No. 426,030
Claims priority, application Japan, Oct. 25, 1988, 63-268754
Int. Cl.[5] C08G 77/04
U.S. Cl. 528—27 12 Claims

1. A polyorganosiloxane compound represented by the following general formula (I):

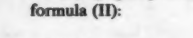


(I)

wherein

j is an integer from 2 to 2,000;

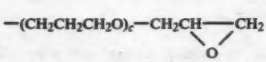
R^1 is a pentafluorophenyl group or a linear or branched fluoroalkyl group as represented by the following general formula (II):



(II)

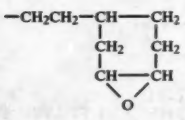
wherein a is an integer from 3 to 18 and b is an integer from 0 to 2a;

R^2 is a substituent as represented by formula (III):



(III)

wherein c is an integer from 1 to 5; or represented by the following formula (IV):



(IV)

R^3 and R^4 are independently each an alkyl group having from 1 to 4 carbon atoms or a phenyl group.

4,987,204

COATING COMPOSITION

Tatsuya Murachi, Aichi, Japan, assignor to Toyoda Gosei Co., Ltd., Nishikasugai, Japan

Filed Jan. 30, 1989, Ser. No. 303,263
Claims priority, application Japan, Apr. 30, 1988, 63-107984; Apr. 30, 1988, 63-107985
Int. Cl.[5] C08G 18/10; C09D 175/04
U.S. Cl. 528—59 3 Claims

1. A coating composition comprising 100 parts by weight of a urethane prepolymer which is the reaction product of a polyol and a polyisocyanate, 2–100 parts by weight of a fluororesin, 2 or more parts by weight of a silicone oil, 0.002–20 parts by weight of a halogenating agent, and a solvent.

4,987,205

POLYPHENOL-ALKANOLAMINE MODIFIED EPOXY RESIN COMPOSITION, PROCESS FOR PREPARATION THEREOF AND PAINT COMPOSITION COMPRISING THIS MODIFIED EPOXY RESIN COMPOSITION

Goro Suzuki, and Matsuura Seiji, both of Ichihara, Japan, assignors to Mitsui Petrochemical Industries, Ltd., Chiyoda, Japan

Filed Feb. 16, 1989, Ser. No. 310,935
Claims priority, application Japan, Feb. 17, 1988, 63-32762
Int. Cl.[5] C08G 59/14, 59/64
U.S. Cl. 528—104 8 Claims

1. A modified epoxy resin composition having a number average molecular weight ($\overline{Mn}$) of 2000 to 4000 and containing, as terminal functional groupsof the molecule (i), 1×10^{-5} to 30×10^{-5} equivalent/g of an epoxy group (ii), 5×10^{-5} to 15×10^{-5} equivalent/g of a phenolic hydroxyl group and (iii) 34×10^{-5} to 150×10^{-5} equivalent/g of a primary alcoholic hydroxyl group wherein said phenolic hydroxyl group is derived from a polyphenol and said primary alcoholic hydroxyl group is derived from a secondary alkanolamine.

6. A modified epoxy resin having a number average molecular weight ($\overline{Mn}$) of 2000 to 4000, said modified epoxy resin obtained by reacting a bisphenol epoxy resin with a bisphenol and diethanolamine and having a combined terminal group comprising (i) 1×10^{-5} to 30×10^{-5} equivalent/g of an epoxy group, (ii) 5×10^{-5} to 15×10^{-5} equivalent/g of a phenolic hydroxyl group, and (iii) 40×10^{-5} to 150×10^{-5} equivalent/g of a primary alcoholic hydroxyl group.

4,987,206

CROSSLINKING OF AROMATIC ETHER CONTAINING POLYMERS BY HALOCARBONS

Israel A. David, Wilmington, Del., assignor to E. I. du Pont de Nemours and Company, Wilmington, Del.

Filed Jun. 4, 1990, Ser. No. 532,414
Int. Cl.[5] C08G 6/00
U.S. Cl. 528—125 27 Claims

1. A process for crosslinking polymers, comprising, contacting an aromatic ether containing polymer with a halocarbon containing two or more chlorine, bromine or iodine atoms bound to one or more saturated carbon atoms, at a temperature of about 200° C. or more, for a period of time sufficient to crosslink the polymer, provided that said temperature is about at or above the glass transition temperature of said polymer, and further provided that said saturated carbon atoms to which said chlorine, bromine or iodine atoms are bound, are not directly bonded to an aromatic ring.

4,987,207

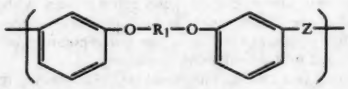
THERMOSETTING RESIN COMPOSITIONS

Norimasa Yamaya; Masahiro Ohta, and Akihiro Yamaguchi, all of Kanagawa, Japan, assignors to Mitsui Toatsu Chemicals, Inc., Tokyo, Japan

Filed May 15, 1989, Ser. No. 351,470
Claims priority, application Japan, May 17, 1988, 63-118362; Aug. 18, 1988, 63-203717
Int. Cl.[5] C08G 73/00; C08F 283/04
U.S. Cl. 528—170 11 Claims

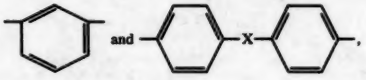
1. A thermosetting resin composition comprising:

(i) about 100 parts by weight of a polymer having recurring units represented by the formula (I):

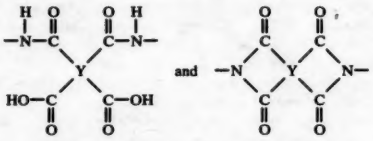


(I)

wherein R_1 represents a divalent group selected from the group consisting of

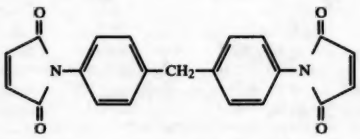


X is
selected from the group consisting of a direct bond, divalent hydrocarbon groups containing from about 1 to about 10 carbon atoms, hexafluorinated isopropylidene groups, carbonyl groups, thio groups, sulfinyl groups, sulfonyl groups and oxo groups, and Z represents at least one compound selected from the group consisting of



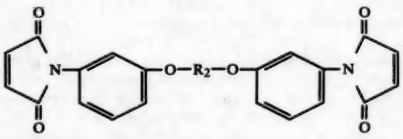
wherein Y represents a tetravalent group selected from the group consisting of aliphatic groups having at least two carbon atoms, cycloaliphatic groups, monocyclic aromatic groups, fused polycyclic aromatic groups, and non-fused cyclic aromatic groups composed of aromatic groups bonded together directly or via a crosslink; and

(ii) from about 5 to about 100 parts by weight of a bismaleimide compound selected from the group consisting of compounds of the formula (II):



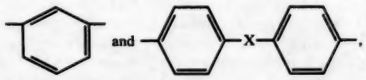
(II)

and compounds of the formula (III):



(III)

wherein R_2 represents a divalent group selected from the group consisting of



X is
selected from the group consisting of a direct bond, divalent hydrocarbon groups having from about 1 to about 10 carbon atoms, hexafluorinated isopropylidene groups, carbonyl groups, thio groups, sulfinyl groups, sulfonyl groups and oxo groups.

4,987,208
MELT PROCESSABLE WHOLLY AROMATIC POLYESTER

Tae W. An; Jong K. Jung; Yung C. Yoo; Pil H. Lee, and Tae W. Son, all of Seoul, Rep. of Korea, assignors to Tong Yang Nylon Co., Ltd and Tong Yang Polyester Co., Ltd., both of, Rep. of Korea

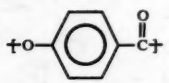
Filed Aug. 11, 1989, Ser. No. 392,571

Claims priority, application Rep. of Korea, Feb. 24, 1989, 892167

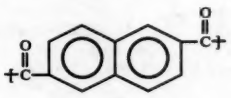
Int. Cl.[5] C08G *63/00, 63/02*

U.S. Cl. 528—272 **6 Claims**

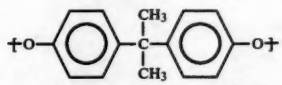
1. A melt processable wholly aromatic polyester which is melt processable at a temperature below 350° C. comprising the recurring moieties (I), (II), (III) and (IV), wherein the recurring moiety (IV) is present in an amount of 5 to 35 mole %, based on the total amount of the moieties:



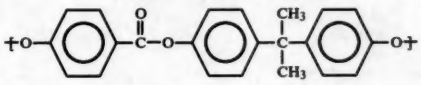
(I)



(II)



(III)



(IV)

4,987,209
DIETHYNYL MONOMERS AND POLYMERS THEREOF

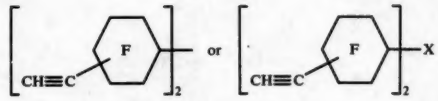
Thomas X. Neenan, Arlington, and George M. Whitesides, Newton, both of Mass., assignors to The President and Fellows of Harvard, Cambridge, Mass.

Division of Ser. No. 101,632, Sep. 28, 1987, abandoned. This application Dec. 7, 1988, Ser. No. 281,911

Int. Cl.[5] C08F *12/30*

U.S. Cl. 526—243 **2 Claims**

1. Homopolymers and copolymers of a compound having the structure



in which

represents a perfluorinated benzene ring and X represents oxygen or sulfur in which said compound amounts to at least 50% by weight of said polymers.

4,987,210

POLYMERIZABLE DERIVATIVES OF 5-OXO-PYRROLIDINECARBOXYLIC ACID

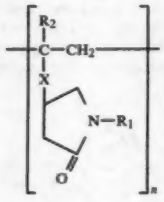
Robert B. Login, Oakland; John J. Merianos, Middletown; Gary Dandreaux, Bloomfield, and Jenn S. Shih, Paramus, all of N.J., assignors to GAF Chemicals Corporation, Wayne, N.J.

Division of Ser. No. 266,183, Nov. 3, 1988, Pat. No. 4,946,967. This application Jan. 16, 1990, Ser. No. 465,292

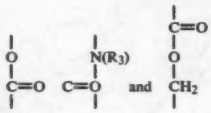
Int. Cl.[5] C08F *26/06*

U.S. Cl. 526—258 8 Claims

1. A homopolymer having the formula



wherein n has a value of from 10 to 50,000 R_2 is H or CH_3, R_1 is H or a hydrocarbon radical having from 1 to 20 carbon atoms, X is selected from the group of



where R_3 is hydrogen or methyl.

4,987,211

PHENYL-ENDCAPPED DEPOLYMERIZABLE POLYMER

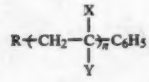
Constance J. Araps, Wappinger Falls; Jon A. Casey, Poughkeepsie, both of N.Y.; Renuka S. Divakaruni, Ridgefield, Conn.; Steven M. Kandetzke, Poughkeepsie, and Chatherine A. Lotsko, Beacon, both of N.Y., assignors to International Business Machines Corporation, Armonk, N.Y.

Continuation of Ser. No. 28,822, Mar. 20, 1987, abandoned. This application Oct. 13, 1989, Ser. No. 423,505

Int. Cl.[5] C08F *220/14*

U.S. Cl. 526—251 4 Claims

1. An unzippable polymer having the following regular structure:



where

X=CH_3 and

Y=

and

wherein R is selected from the group consisting of a phenyl or methyl group.

4,987,212

COPOLYMERIZATION OF ETHYLENE AND AN ALPHA-OLEFIN HAVING SIX CARBON ATOMS COMPRISING HEXENE-1 OR 4-METHYL-PENTENE-1 IN A FLUIDIZED BED

Frederic Morterol, Lavera, and Jean-Louis Vidal, Martigues, both of France, assignors to BP Chimie Societe Anonyme, Lavera, France

Continuation of Ser. No. 880,126, Jun. 30, 1986, abandoned, which is a division of Ser. No. 689,017, Jan. 3, 1985, Pat. No. 4,642,328, which is a continuation of Ser. No. 525,545, Aug. 22, 1983, abandoned. This application Nov. 3, 1987, Ser. No. 117,400

Claims priority, application France, Sep. 7, 1982, 82 15162

Int. Cl.[5] C08F *210/14*

U.S. Cl. 526—348.4 5 Claims

1. A co-polymer of ethylene and 4-methyl-pentene-1, characterised in that it is the form of a powder consisting of non-sticky particles having a mean diameter by mass, Dm, comprised between 300 and 1500 microns, and a particle size distribution such that the ratio Dm:Dn is less than or equal to 3.5, and characterised in that it has:

(a) a content of units derived from 4-methyl-pentene-1 comprised between 4 and 15% by weight,

(b) a density comprised between 0.910 and 0.940,

(c) a bulk density comprised between 0.35 and 0.45 g/cm^3,

(d) an unsaturation level of less than 0.2 double bonds per 1000 carbon atoms,

(e) a single melting point comprised between 116° and 128° C., determined by scanning differential calorimetric analysis after re-heating to 200° C., cooling at the rate of 16° C. per minute and heating at the rate of 16° C. per minute,

(f) a structure with a small amount of long-chain branches such that g^* is greater than or equal to 0.90 wherein g^* is the ratio η/η_1, η being the intrinsic viscosity of the co-polymer and η_1 being the intrinsic viscosity of a liner polyethylene having the same weight average molecular weight as the said copolymer, and is obtained by a co-polymerisation process comprising providing a catalyst system comprising on the one hand a co-catalyst consisting of at least one organo-metallic compound of a metal of Groups II and III of the Periodic Table of Elements and on the other hand a catalyst comprising a support based essentially on magnesium chloride and optionally containing an aluminium chloride, consisting of particles of spheroidal shape having a mean diameter by mass comprised between 10 and 100 microns and showing a particle size distribution such that the ratio Dm/Dn of the mean diameter by mass, Dm, to the mean diameter by number, Dn, of the particles is less than or equal to 3, on to which support there has been precipitated a derivative of a transition metal of Groups IV, V and VI of the Periodic Table of Elements which is known for its catalytic properties in the polymerisation and co-polymerisation of alpha-olefins,

wherein before the said co-polymerisation is carried out, subjecting the catalyst to a pre-polymerisation of the ethylene or a pre-co-polymerisation of the ethylene and 4-methyl-pentene-1 in suspension in an inert liquid medium so as to obtain a prepolymer having from 0.1 to 500 g. of polymer or co-polymer per milli-gramme-atom of transition metal,

recovering said prepolymer as a dry powder,

co-polymerising ethylene and said 4-methyl-pentene-1 in the gaseous state in admixture with said prepolymer powder, an inert gas such as nitrogen, methane or ethane and optionally with hydrogen, the gaseous mixture circulating from bottom to top through a fluidised bed of the co-polymer being formed, the co-polymerisation being effected at a temperature comprised between 50° and 90° C., in the presence of said catalyst, and

the partial pressure (pp) of the various constituents of the gaseous mixture being such that: pp 4-methyl-pentene-1 is in the range 0.05 MPa to 0.15 MPa, pp 4-methyl-pentene-1/pp ethylene is in the range 0.15 to 0.5, pp hydrogen/pp

ethylene is in the range 0.05 to 0.5, pp inert gas/total pressure is in the range 0.2 to 0.9.

4,987,213

POLYURETHANE AND PROCESS FOR PREPARING SAME

Shigeo Hirose, Matsudo; Shoichiro Yano, Tsukuba; Kyoe Hatakeyama, Inashiki, and Kunio Nakamura, Kawasaki, all of Japan, assignors to Director-General of Agency of Industrial Science and Technology, Japan

Filed Mar. 16, 1989, Ser. No. 323,996

Claims priority, application Japan, May 16, 1988, 63-120170

Int. Cl.[5] C08G *18/00, 59/00*

U.S. Cl. 527—301 14 Claims

1. A polyurethane which is the reaction product of an admixture consisting essentially of a polyisocyanate and a solvent solution of a polyhydroxy compound selected from the group consisting of lignocellulose having substantially all its hydroxyl groups unmodified, organosolv lignin and explosion lignin.

4,987,214

IMIDE TYPE PREPOLYMER COMPOSITION COMPRISING UNSATURATED BIS IMIDE, DIAMINE, AND A TERTIARY BUTYL HYDROQUINONE POLYMERIZATION INHIBITOR

Kojiro Kan; Toru Tomoshige, and Hideya Aoki, all of Ichihara, Japan, assignors to Mitsui Petrochemical Industries, Ltd., Tokyo, Japan

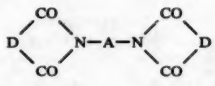
Continuation-in-part of Ser. No. 280,591, Dec. 6, 1988, abandoned. This application Mar. 20, 1990, Ser. No. 495,581

Claims priority, application Japan, Dec. 8, 1987, 62-310597; Dec. 8, 1987, 62-310598; Dec. 8, 1987, 62-310599

Int. Cl.[5] C08G *73/12*

U.S. Cl. 528—317 19 Claims

1. An imide prepolymer composition comprising the following components (A) and (B) at the (A)/(B) molar ratio of 0.9–1.5 and 0.01–5.0% by weight, based on the sum of said components (A) and (B), of at least one radical polymerization inhibitor selected from the group consisting of t-butylhydroquinone and 2,5-di-t-butylhydroquinone, component (A) being an unsaturated bisimide represented by the following formula (I):



wherein D represents a divalent group containing a carbon-carbon double bond, and A represents a divalent group containing at least 2 carbon atoms, and component (B) being a diamine represented by $H_2N—B—NH_2$ wherein B represents a divalent group containing less than 30 carbon atoms.

4,987,215

WHOLLY AROMATIC POLYAMIDE, PROCESS FOR PREPARING SAME AND STRUCTURE THEREOF.

Günter Keil, Hofheim am Taunus; Karl Heinrich, Grossaitingen, and Peter Klein, Wiesbaden, all of Fed. Rep. of Germany, assignors to Hoechst Aktiengesellschaft, Frankfurt am Main, Fed. Rep. of Germany

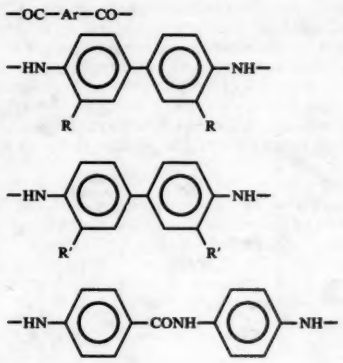
Filed Oct. 16, 1989, Ser. No. 422,091

Claims priority, application Fed. Rep. of Germany, Oct. 18, 1988, 3835441

Int. Cl.[5] C08G *69/32*

U.S. Cl. 528—329.1 12 Claims

1. An aromatic copolyamide, soluble in organic polyamide solvents, which comprises at least 95 mol% of recurrent structural units of the formulae



and up to 5 mol% of structural units E or F or combinations thereof which contain m-bonds and are derived from aromatic dicarboxylic acids (E') or from aromatic diamines (F') or combinations thereof, the totals of the mol fractions of the structural units A + E and of the mol fractions of the structural units B + C + D + F being substantially the same,

—Ar— being a divalent aromatic radical, other than biphenylene, the valency bonds of which are in the para-position or in a comparable coaxial or parallel position and which are optionally substituted by one or two inert radicals,

—R and —R' being different from one anotehr and being lower alkyl radicals or lower alkoxy radicals,

and the fractions of the diamine components B, C and D relative to the total quantity of these diamine components being inside the following limits:

structural unit B: 30–55 mol%,

structural unit C: 15–35 mol %,

structural unit D: 20–40 mol%.

4,987,216

WHOLLY AROMATIC POLYAMIDE

Günter Keil, Hofheim am Taunus; Karl Heinrich, Grossaitihgen, and Peter Klein, Wiesbaden, all of Fed. Rep. of Germany, assignors to Hoechst Aktiengesellschaft, Frankfurt am Main, Fed. Rep. of Germany

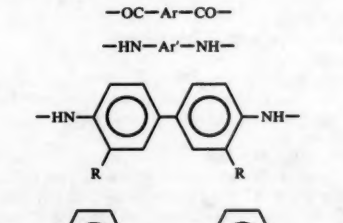
Filed Oct. 16, 1989, Ser. No. 422,153

Claims priority, application Fed. Rep. of Germany, Oct. 18, 1988, 3835419

Int. Cl.[5] C08G *69/32, 69/12*

U.S. Cl. 528—329.1 12 Claims

1. An aromatic copolyamide, soluble in organic polyamide solvents, which comprises at least 95 mol % of recurrent structural units of the formulae



and up to 5 mol % of structural units E or F or combinations

thereof which contain m-bonds and are derived from aromatic dicarboxylic acids (E') or from aromatic diamines (F') or combinations thereof, the totals of the mol fractions of the structural units A+E and of the mol fractions of the structural units B+C+D+F being substantially the same,

—Ar— and —Ar'— being divalent aromatic radicals other then biphenefene, the valency bonds of which are in the para-position or in a comparable coaxial or parallel position and which are optionally substituted by one or two inert radicals,

—R being a lower alkyl radical,

and the fractions of the diamine components B, C and D relative to the total quantity of these diamine components being inside the following limits:

structural unit B: 15–25 mol %

structural unit C: 45–65 mol %

structural unit D: 15–35 mol %.

4,987,217

WHOLLY AROMATIC POLYAMIDE

Günter Keil, Hofheim am Taunus; Karl Heinrich, Grossaitingen, and Peter Klein, Wiesbaden, all of Fed. Rep. of Germany, assignors to Hoechst Aktiengesellschaft, Frankfurt am Main, Fed. Rep. of Germany

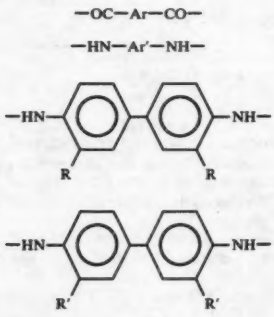
Filed Oct. 16, 1989, Ser. No. 422,116

Claims priority, application Fed. Rep. of Germany, Oct. 18, 1988, 3835405

Int. Cl.[5] C08G *69/32*

U.S. Cl. 528—340 **12 Claims**

1. An aromatic copolyamide, soluble in organic polyamide solvents, which comprises at least 95 mol % of recurrent structural units of the formulae



and up to 5 mol % of structural units E or F or combinations thereof which contain m-bonds and are derived from aromatic dicarboxylic acids (E') or from aromatic diamines (F') or combinations thereof, the totals of the mol fractions of the structural units A+E and of the mol fractions of the structural units B+C+D+F being substantially the same,

—Ar— and —Ar'— being divalent aromatic radicals other than biphenylene, the valency bonds of such are in the para- position or in a comparable coaxial or parallel position and which are optionally substituted by one or two inert radicals.

—R and —R' being different from one another and being lower alkyl radicals or lower alkoxy radicals,

and the fractions of the diamine components B, C and D relative to the total quantity of these diamine components being inside the following limits:

structural unit B: 20–30 mol %

structural unit C: 35–55 mol %,

structural unit D: 15–40 mol %.

4,987,218

POLYBENSHYDROL COMPOSITIONS ENDING WITH ETHYLENIC UNSATURATED GROUPS, CROSS-LINKED POLYMIDES RESULTING FROM THEIR THERMAL POLYERMIZATION AND THE USE OF SAID COMPOSITIONS

Jean Malinge, Givors; Guy Rabilloud, Grenoble, and Bernard Sillion, Lyon, all of France, assignors to Centre D'Etude des Materiaux Organiques pour Technologies Avances (Cemota), Vernaison, France

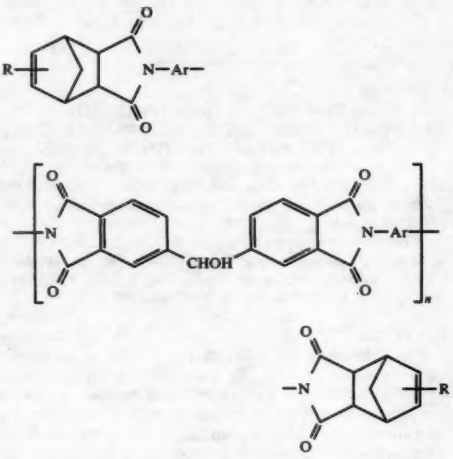
Filed May 29, 1987, Ser. No. 55,287

Claims priority, application France, Feb. 13, 1987, 87 01983

Int. Cl.[5] C08G *69/26, 73/10*

U.S. Cl. 528—353 **19 Claims**

1. A polymer composition characterized in that it comprises poly(benzhydrolimide) chains ending with ethylenic unsaturated groups, represented by the general formula



wherein Ar is a divalent aromatic radical, carbocyclic or heterocyclic, formed of one or more rings, the two valences of which are on separate carbon atoms not in ortho position with respect to each other, R is a hydrogen atom or a monovalent hydrocarbon radical, and number n represents the average polycondensation degree of said poly(benzhydrolimide) chains.

4,987,219

COPOLYMERIC AND AMPHIPHILIC POLYIMIDE PRECURSOR, PROCESS FOR PREPARING THE SAME AND THIN FILM

Masakazu Uekita, and Hiroshi Awaji, both of Kobe, Japan, assignors to Kanegafuchi Kagaku Kogyo Kabushiki Kaisha, Osaka, Japan

Filed Apr. 22, 1987, Ser. No. 41,275

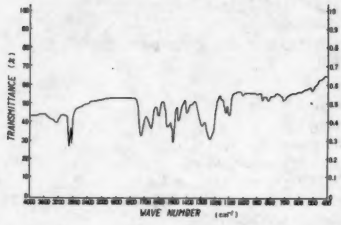
Claims priority, application Japan, Apr. 25, 1986, 61-97568

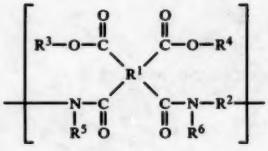
The portion of the term of this patent subsequent to Sep. 4, 2007, has been disclaimed.

Int. Cl.[5] C08G *8/02, 12/00, 69/26, 63/00*

U.S. Cl. 528—353 **19 Claims**

1. A copolymeric and amphiphilic polyimide precursor having the recurring unit of the formula (1):



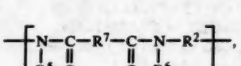


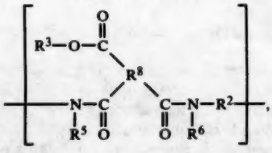
(I)

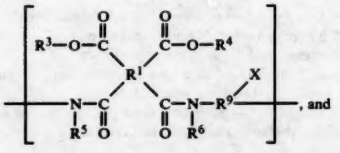
wherein

is a tetravalent group having at least 2 carbon atoms, R^2 is a bivalent group having at least 2 carbon atoms, and each of R^3, R^4, R^5 and R^6 is independently a hydrogen atom or a monovalent group having 1 to 30 carbon atoms selected from the group consisting of: (i) an aliphatic group, (ii) an alicyclic group, (iii) an aromatic group, (iv) a group in which an aliphatic group is combined with an aromatic group or an alicyclic group, said groups (i–iv) being unsubstituted or substituted by a substituent selected from the group consisting of a halogen atom, a nitro group, an amino group, a cyano group, a methoxy group and an acetoxyl group, provided that at least one of R^3, R^4, R^5 and R^6 has at least 12 carbon atoms;

and at least one recurring unit selected from the group consisting of units of the formulas:

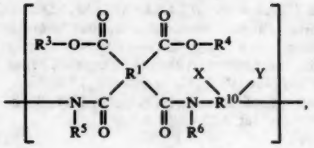






, and

-continued



wherein

R^1, R^2, R^3, R^4, R^5 and R^6 are as defined above, R^7 is a bivalent group having at least 2 carbon atoms, R^8 is a trivalent group having at least 2 carbon atoms, R^9 is a trivalent group having at least 2 carbon atoms, R^{10} is a tetravalent group having at least 2 carbon atoms, each of X and Y is independently selected from the group consisting of —NHR′, —CONHR′ and —SO_2NHR′ wherein R′ is an alkyl group or hydrogen atom.

4,987,220

PURIFICATION OF POLY(N-VINYLCARBAZOLE) CONTAINING IMPURITIES

Reinhard Aldag, Eberbach, and Peter Neumann, Mannheim, both of Fed. Rep. of Germany, assignors to BASF Aktiengesellschaft, Ludwigshafen, Fed. Rep. of Germany

Filed Dec. 1, 1988, Ser. No. 278,354

Claims priority, application Fed. Rep. of Germany, Dec. 2, 1987, 3740786

Int. Cl.[5] C08F *6/00*

U.S. Cl. 528—491 **3 Claims**

1. A process for the purification of poly(N-vinylcarbazole) or a copolymer of N-vinylcarbazole with up to 30 weight percent of at least one monomer copolymerizable therewith in a mixture containing the polymer in solid form and impurities, which process consists of extracting said poly(N-vinylcarbazole) or copolymer thereof in solid form continuously at a temperature of from 40 to 80° C. with an ester of aliphatic carboxylic acids wherein the carboxylic acid moiety is of 1 to 6 carbon atoms.

4,987,221

BISDIAZONIUM SALTS OF 4,4′-DIAMINO-3,3′-DIALKOXYBIPHENYLS AND A PROCESS FOR THEIR PREPARATION

Hasso Hertel, Mühlheim am Main; Klaus Hunger, Kelkheim, and Heinrich Frölich, Niedernhausen/Taunus, all of Fed. Rep. of Germany, assignors to Hoechst Aktiengesellschaft, Frankfurt am Main, Fed. Rep. of Germany

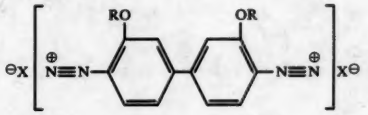
Filed Mar. 27, 1986, Ser. No. 844,858

Claims priority, application Fed. Rep. of Germany, Mar. 29, 1985, 3511547

Int. Cl.[5] C07c *245/20*; D06P *3/68*

U.S. Cl. 534—561 **5 Claims**

1. A bis-diazonium salt of the formula



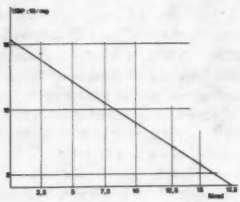
in which R denotes linear or branched alkyl or alkoxyalkyl having a total of 3–5 carbon atoms and X⊖ represents HSO_3^-, BF_4^- or $^-$.

4,987,222

PROCESS FOR THE CONTROLLED PREPARATION OF LOW MOLECULAR WEIGHT GLUCOSAMINOGLYCANS

Luigi De Ambrosi, Santhia; Walter Recchia, and Gianni Ferrari, both of Milan, all of Italy, assignors to Mediolanum Farmaceutici Spl and Laboratori Derivati Organici, Milan, Italy

Filed Nov. 16, 1987, Ser. No. 120,953
Claims priority, application Italy, Nov. 24, 1986, 22434 A/86
Int. Cl.[5] C08B *37/10*
U.S. Cl. 536—21 12 Claims



1. A process for the controlled preparation of low molecular weight glucosaminoglycans of from 1,000 to 35,000 daltons, and possessing anticoagulant activity of between 10 and 250 U/mg and an anti-Xa/APTT ratio of between 1 and 15, which comprises treating conventional high molecular weight glucosaminoglycans in the solid state or in solution form with a rectilinear gamma ray beam at doses within the range of 2.5 to 20 Mrad supplied in the static or dynamic phase by successive irradiation stages with cooling intervals between one irradiation stage and the next, then subjecting the solution obtained to chemical fractionation in order to eliminate the high molecular weight fractions, purifying the base fraction by reverse osmosis, further fractionating the purified solution through Sephacryl or Sephadex resin columns, transferring the fractions obtained to cationic resins, then neutralizing them with alkaline solutions and lyophilizing.

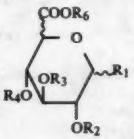
4,987,223

DERIVATIVES OF THE URONIC ACID

Jean Choay, Paris; Jean-Claude Jacquinet, Orleans-La-Source; Maurice Petitou, Paris, and Pierre Sinay, Orleans, all of France, assignors to Choay S.A., Paris, France

Filed Oct. 27, 1982, Ser. No. 453,731
Claims priority, application France, Dec. 23, 1981, 81 24132; Jan. 15, 1982, 82 00621; Feb. 1, 1982, 82 01575; Feb. 16, 1982, 82 02526; May 28, 1982, 82 09392; Jun. 22, 1982, 82 10891; Jun. 22, 1982, 82 10892; Aug. 6, 1982, 82 13804; Sep. 20, 1982, 82 15804; Sep. 20, 1982, 82 15803; Oct. 27, 1982, 82 18001
Int. Cl.[5] C07H *3/00, 13/00, 15/00*
U.S. Cl. 536—17.7 6 Claims

1. A compound having the following formula:



wherein

a. R_1 is selected from group consisting of
   i. Br,
   ii. Cl,
   iii. —O— imidoyl,
   iv. —O-allyl,
   v. —O-vinyl,
   vi. —OCH_3,
   vii. —O—C_6H_5,
   viii. —O—CO—CH_3,
   Xi. —OH,
   x. an orthoester which together with —OR_2 forms —$OH(CH_3)(OtBu)O$—,
   xi. an orthoester which together with —OR_2 forms —$OC(CH_3)(OCH_3)O$—, and
   xii. —O-nitrophenyl;
b. R_2 is selected from the group consisting of
   i. methyl,
   ii. benzyl,
   iii. acetyl,
   vi. benzoyl,
   vii. chloroacetyl,
   viii. an orthoester which together with —OR_1 forms —$OC(CH_3)(OtBu)O$—, and
   ix. an orthoester which together with —OR_1 forms—$OC(CH_3)(OCH_3)O$—;
c. R_3 is selected from the group consisting of
   i. methyl,
   ii. benzyl,
   iii. acetyl,
   iv. benzoyl,
   v. chloroacetyl,
   vi. allyl,
   vii. vinyl,
d. R_4 is selected from the group consisting of
   i. methyl,
   ii. benzyl,
   iii. acetyl,
   iv. benzoyl,
   v. chloroacetyl,
   vi. allyl,
   vii. vinyl, and
   viii. paramethoxy benzyl;
e. R_6 is selected from the group consisting of
   i. methyl,
   ii. benzoyl, and
   iii. a cation of a pharmaceutically acceptable salt;

provided that

where R_1 is a methoxy group, R_4 is not methyl,
where $COOR_6$ is in the glucuronic position, R_2, R_3, and R_4 are not identical,
where R_1 and R_2 form an orthoester, R_3 and R_4 are not acetyl,
at least one of R_2 or R_3 is acetyl.

4,987,224

METHOD OF PREPARATION OF 2',3'-DIDEOXYNUCLEOSIDES

Chung K. Chu, Athens, Ga., assignor to University of Georgia Research Foundation, Inc., Athens, Ga.

Filed Aug. 2, 1988, Ser. No. 227,163
Int. Cl.[5] C07H *19/073, 19/173*
U.S. Cl. 536—23 17 Claims

1. A process of preparing 2',3'-dideoxynucleosides, comprising:

(a) preparing an acetal of glyceraldehyde from D-mannitol;
(b) reacting the acetal of glyceraldehyde with a phosphorous ylid in a nonpolar solvent to produce a geometric isomeric mixture including E α,β-unsaturated esters;
(c) reacting the geometric isomeric mixture with a nucleophile;
(d) cyclizing a product of step (c) to a 4-substituted-3,4-dihydro-5-hydroxymethyl-5(H)-furan-2-one;
(e) protecting the 5-hydroxymethyl group;
(f) reducing the furan-2-one to a 3-substituted-5-0-substituted-2,3-dideoxy-D-erythro-pentofuranose;
(g) activating the 1-0 position of the pentofuranose; and
(h) reacting the activated pentofuranose with a nitrogenous base.

4,987,225

REMOVAL OF WATER MISCIBLE MATERIALS FROM GLYCOSIDE MIXTURES

Carl Pickens, and Patrick M. McCurry, both of Decatur, Ill., assignors to Henkel Kommanditgesellschaft auf Aktien, Duesseldorf, Fed. Rep. of Germany

Filed Dec. 23, 1988, Ser. No. 290,535
Int. Cl.[5] C07H *15/00, 1/00;* C08B *37/00;* A61K *31/00*
U.S. Cl. 536—124 30 Claims

1. A process for removing hydrophillic materials from a glycoside surfactant material which comprises: contacting the glycoside surfactant material, a hydrophobic water immiscible alcohol having from about 8 to about 30 carbon atoms, solvent for the glycoside surfactant material phase and water, the water being present in an amount at least sufficient to form a separate water containing phase and below about 50% by weight of the glycoside surfactant material and solvent, for a time sufficient to separate at least a portion of the hydrophillic material from the glycoside surfactant and separating the water containing phase from the solvent phase.

26. A glycoside composition (a) which is composed predominantly of glycoside surfactant molecules of the formula:

$$RO(R^1O)_y(Z)_x \quad (A)$$

wherein R is a hydrophobic aglycone substituent composed of a monovalent organic radical containing from about 8 to about 30 carbon atoms; 0 is an oxygen atom; R^1 is a divalent hydrocarbon radical containing from 2 to about 4 carbon atoms; y is a number having an average value of from 0 to about 12; Z represents a moiety derived from a reducing saccharide containing 5 to 6 carbon atoms; and x is a number having a value of from 1 to about 5; (b) which has an overall average x value of at least 1.2 and wherein, as an overall average value, the hydrophobic aglycone substituent, R, contains at least 9 carbon atoms; and (c) which contains, on a total glycoside surfactant weight basis, less than 0.5 weight percent of hydrophilic polysaccharide constituents and less than 5 weight percent of formula (A) polyglycoside species having individual x values greater than 10.

4,987,226

RHENIUM-OXO-PORPHYRIN COMPLEXES

Johann Buchler, Darmstadt; Steffen Kruppa, Neu-Isenburg; Manfred Schmidt, Geinhausen, all of Fed. Rep. of Germany, and Guenter Prescher, Larchmont, N.Y., assignors to Degussa Aktiengesellschaft, Frankfurt am Main, Fed. Rep. of Germany

Continuation of Ser. No. 247,299, Sep. 21, 1988, abandoned. This application Jul. 18, 1990, Ser. No. 555,672
Claims priority, application Fed. Rep. of Germany, Sep. 21, 1987, 3731689
Int. Cl.[5] C07D *487/22*
U.S. Cl. 540—145 3 Claims

1. A rhenium(V)-oxo complex with
octaethyl porphyrin or
5,10,15,20-tetraphenyl porphyrins or
5,10,15,20-tetra(4-pyridyl)-porphyrins as ligands,
wherein said ligands optionally carry an anion on the central atom; wherein the hydrogen atoms or free electron pairs of said ligands can be substituted once or several times on the phenyl, groups or pyridyl groups of the porphyrin ligands by halogen, hydroxy, carboxy, cyano, rhodano, nitro, C_1–C_6-alkyl, trihalogen methyl, C_1–C_6-alkoxy, C_1–C_6-alkane sulfonyloxy, aminocarbonyl, aminocarbonyl containing one or two C_1–C_6-alkyl groups, C_1–C_6-alkyl carbonyl, amino, di-C_1–C_6-alkyl amino, C_1–C_6-alkanoyl amino, C_1–C_6-alkyl-C_1–C_6-alkanoyl amino, C_1–C_6-alkane sulfonyl amino, C_1–C_6-alkyl-C_1–C_6-alkane sulfonyl amino, aminosulfonyl, aminosulfonyl containing one or two C_1–C_6-alkyl groups, C_1–C_6-alkoxysulfonyl (—SO_2—O—C_1–C_6—alkyl) sulfo or C_1–C_6-alkane sulfonyl and two of these groups can also be the methylene dioxy group, further provided that when the ligand is unsubstituted, the anion may not be F^-, O^{2-} (μ-oxo), CH_3O^-, or $C_6H_5O^-$.

4,987,227

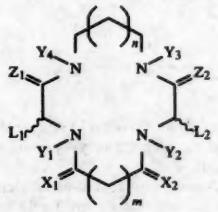
POLYAZAMACROCYCLES AND THEIR METAL COMPLEXES

Cynthia Burrows; Heungsik Yoon, both of Stony Brook, N.Y., and Thomas R. Wagler, Chatham, N.J., assignors to The Research Foundation of State University of New York, Albany, N.Y.

Continuation-in-part of Ser. No. 261,032, Oct. 21, 1988, abandoned. This application Feb. 23, 1990, Ser. No. 484,102
Int. Cl.[5] C07D *257/02*
U.S. Cl. 540—452 25 Claims

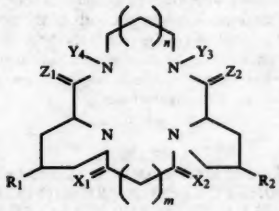
1. A 13 or 14 member macrocyclic compound having the following ring nucleus:

IA



or

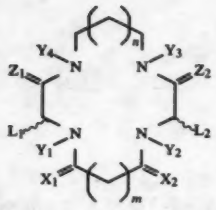
IB



wherein:
n=0 or 1;
m=0 or 1;
n+m>0;
X_1, X_2, Z_1, and Z_2 independently represent H_2 or 0 except that X_1, X_2, Z_1, and Z_2 do not all represent H_2; and
Y_1, Y_2, Y_3, and Y_4 independently represent H, lower alkyl or CH_2COOH; and
L_1 and L_2 independently represent side chains of alpha amino acids, except that L_1 and L_2 do not both represent H; and
R_1 and R_2 independently represent H or OH; and
two carbon atoms, one bearing L_1 and another bearing L_2, have a configuration wherein both of the two carbon atoms have the S configuration, or both of the two carbon atoms have the R configuration, or one of the two carbon atoms has the S configuration while the other has the R configuration.

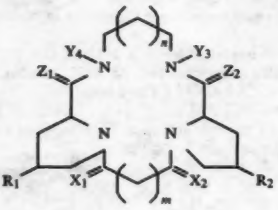
13. A complex of a transition metal ion and a 13 or 14 member macrocyclic ring compound having the following ring nucleus:

IA



or

IB



wherein:

n=0 or 1;

m=0 or 1;

n+m>0;

X_1, X_2, Z_1, and Z_2 independently represent H_2 or 0; and

Y_1, Y_2, Y_3, and Y_4 independently represent H, lower alkyl or CH_2COOH; and

L_1 and L_2 independently represent side chains of alpha amino acids, except that L_1 and L_2 do not both represent H; and

R_1 and R_2 independently represent H or OH; and

two carbon atoms, one bearing L_1 and another bearing L_2, have a configuration wherein both of the two carbon atoms have the S configuration, or both of the two carbon atoms have the R configuration, or one of the two carbon atoms has the S configuration while the other has the R configuration.

4,987,228

POLYTRIAZINE COMPOUNDS CONTAINING RECURRING PIPERIDYLAMIDINOTRIAZINE STRUCTURAL UNITS AND THEIR USE AS STABILIZERS FOR ORGANIC MATERIALS

Giuseppe Cantatore, Bitonto, and Valerio Borzatta, Bologna, both of Italy, assignors to Ciba-Geigy Corporation, Ardsley, N.Y.

Filed Jul. 31, 1989, Ser. No. 79,978

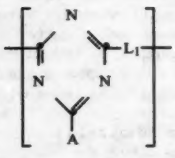
Claims priority, application Italy, Aug. 7, 1986, 21434 A/86

Int. Cl.[5] C07D 401/14

U.S. Cl. 544—198 **10 Claims**

1. A polytriazine compound having a number average molecular weight from 1000 to 20 000 and containing recurring piperidylamidinotriazine structural units of the formula (IA)

(IA)



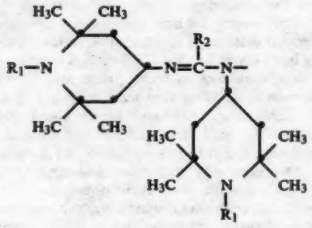
or a combination of said structural units of the formula (IA) with recurring structural units of the formula (IB)

(IB)

with molar proportions of (IA) and (IB) from 30% to 100% for (IA) and 0 to 70% for (IB),

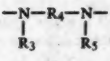
A is a group of the formula (II)

(II)



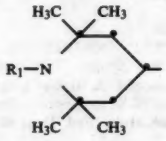
where R_1 is hydrogen, O, CN, NO, cyanomethyl, C_1–C_{12}-alkyl, C_3–C_{12}-alkenyl or C_3–C_{12}-alkynyl with the proviso that the carbon atom attached to the nitrogen atom is a primary carbon atom, C_7–C_{12}-aralkyl, C_1–C_{12}-acyl, 2,3-epoxypropyl, 2,3-dihydroxypropyl or C_5–C_{18}-aryl, 2,3-epoxypropyl, 2,3-dihydroxypropyl or OH-monosubstituted C_2C_6-alkyl and R_2 is hydrogen, C_1–C_{18}-alkyl, C_5–C_{18}-cycloalkyl, C_6–C_{18}aryl or C_7–C_{18}-aralkyl, L_1 and L_3 which are identical or different are groups of the formula (III)

(III)



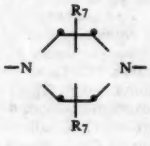
in which R_3 and R_5 which are identical or different are hydrogen, C_1–C_{12}-alkyl, C_5–C_{12}-cycloalkyl or a group of the formula (IV)

(IV)

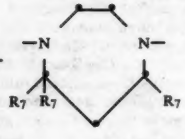


with R_1 being as defined above, and R_4 is C_2–C_{12}-alkylene, C_6–C_{15}-cycloalkylene, C_6–C_{12}-arylene, C_7–C_{12}-aralkylene or C_4–C_{12}-alkylene which is interrupted in the chain by one or two oxygen atoms or by one or two groups

R_6 being as defined for R_3 and R_5, or L_1 and/or L_3 are heterocyclic groups of the formula (V), (Va) or (Vb)

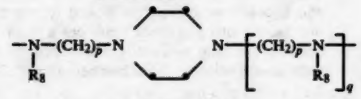


(V)



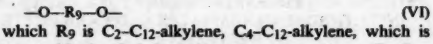
(Va)

-continued



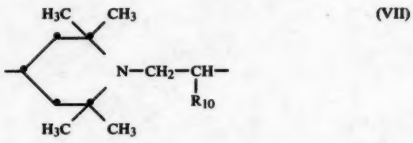
(Vb)

in which R_7 is hydrogen or methyl, R_8 is as defined for R_3 and R_5, p is an integer from 2 to 6 and q is 0 or 1, and, if the polytriazine compound essentially consists of recurring structural units of the formula (IA), L_1 is additionally group of the formula (VI)



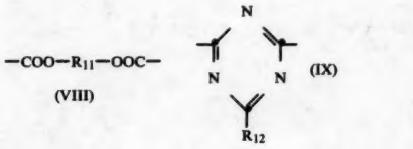
(VI)

in which R_9 is C_2–C_{12}-alkylene, C_4–C_{12}-alkylene, which is interrupted in the chain by one or two oxygen atoms, C_6–C_{15}-cycloalkylene, C_6–C_{12}-arylene, C_7–C_{12}-aralkylene or a group of the formula (VII)



(VII)

with R_{10} being hydrogen, C_1C_4alkyl or phenyl, L_2 is C_2–C_{12}-alkylene, C_4–C_{12}-alkylene which is interrupted in the chain by one or two oxygen atoms, C_3–C_6-hydroxyalkylene, C_7–C_{12}-aralkylene, C_2–C_{18}-diacyl, C_4–C_{18}-dicarbamoyl, C_1–C_{10}-alkylene-CO-or a group of the formula (VIII) or (IX)



(VIII) (IX)

in which R_{11} is as defined for R_9 and R_{12} is morpholino, pyrrolidino, piperidino, 1-hexahydroazepinyl or a group $R_{13}Z$-where R_{13} is hydrogen, C_1–C_{12}-alkenyl, C_5–C_{12}-cycloalkyl, C_3–C_{12}alkenyl or a group of the formula (IV) and —Z—is —O—, —S—or a group

where R_{14} is as defined for R_{13}, with the proviso that, if the polytriazine compound contains a combination of structural units of the formula (IA) with those structural units of the formula (IB), at least one group of the formula (IV) is present in L_1 or L_2 or L_3.

4,987,229

PURIFICATION OF SALTS OF RIBOFLAVIN 5'-PHOSPHATE, IN PARTICULAR OF MONOSODIUM RIBOFLAVIN 5'-PHOSPHATE

Walter Dobler, Heidelberg; Manfred Eggersdorfer, Frankenthal, and Joachim Paust, Neuhofen, all of Fed. Rep. of Germany, assignors to BASF Aktiengesellschaft, Ludwigshafen, Fed. Rep. of Germany

Filed Mar. 15, 1989, Ser. No. 323,795

Claims priority, application Fed. Rep. of Germany, Mar. 31, 1988, 3810957

Int. Cl.[5] C07F *9/08*

U.S. Cl. 544—243 **15 Claims**

1. A process for the purification of salts of riboflavin 5'-phosphate from a crude riboflavin 5'-phosphate solution which is obtained by phosphorylating riboflavin and reacting the resulting riboflavin 5'-phosphate, contaminated with unconverted riboflavin and isomeric riboflavin monophosphates and diphosphates, with an alkali metal hydroxide or a nitrogen base, to form said crude riboflavin 5'-phosphate solution, comprising the steps of:

forming an approximately 1–15 wt.% homogeneous clear aqueous riboflavin 5'-phosphate salt solution having a pH of from 4–8.

contacting said homogeneous clear aqueous riboflavin 5'-phosphate salt solution with a polymeric adsorber resin in the form of small insoluble spheres which have high mechanical strength, macroreticular porosity, a uniform pore size distribution, a large active surface area and a chemically homogeneous, nonionic structure and which have been prepared by copolymerization from polystyrene/-divinylbenzene, acrylic acid derivatives/divinylbenzene or methacrylic acid derivatives/divinylbenzene to form a contacted solution containing the riboflavin 5'-phosphate salt, wherein unconverted riboflavin is adsorbed to the polymeric adsorber resin from said contacted solution, and

isolating said contacted solution containing the riboflavin 5'-phosphate salt substantially free of riboflavin by removing the polymeric adsorber with the adsorbed free riboflavin.

4,987,230

PHOTOPOLYMERIZATION SENSITIZERS ACTIVE AT LONGER WAVELENGTHS

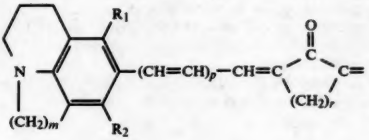
Bruce M. Monroe, Wilmington, Del., assignor to E. I. du Pont de Nemours and Company, Wilmington, Del.

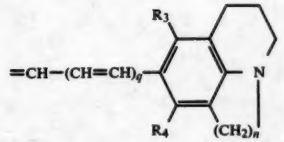
Continuation-in-part of Ser. No. 228,806, Jul. 28, 1988, abandoned. This application Dec. 8, 1989, Ser. No. 447,721

Int. Cl.[5] C07D *451/02*

U.S. Cl. 546—94 **10 Claims**

1. A compound of the formula:





wherein p and q independently are 0 or 1 and r, m and n independently are 2 or 3; and R_1, R_2, R_3 and R4, independently are

selected from the group consisting of hydrogen and alkyl having 1 to 4 carbon atoms or alkoxy having 1 to 4 carbon atoms.

4,987,231

OPTICAL RESOLUTION METHOD FOR 3R-(3-CARBOXYBENZYL)-6-(5-FLUORO-2-BENZOTHIAZOLYL)METHOXY-4R-CHROMANOL

Robert C. Friedmann, Old Saybrook, and George J. Quallich, North Stonington, both of Conn., assignors to Pfizer Inc., New York, N.Y.

Filed Aug. 4, 1989, Ser. No. 389,715

Int. Cl.[5] C07D *435/04*

U.S. Cl. 546—135 **1 Claim**

1. The quinine salt of 3R-(3-carboxybenzyl)-6-(5-fluoro-2-benzothiazolyl)methoxy-4R-chromanol.

4,987,232

PREPARATION OF 2-CHLOROPYRIDINE 3-CARBOXYLIC ACID ESTERS

Ludwig Schröder, Ingelheim am Rhein, Fed. Rep. of Germany, assignor to Shell Internationale Research Maatschappij, B.V., The Hague, Netherlands

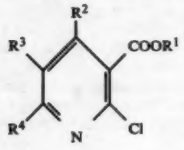
Filed Dec. 5, 1989, Ser. No. 446,135

Claims priority, application Fed. Rep. of Germany, Dec. 5, 1988, 3840954

Int. Cl.[5] C07D *215/16, 215/12, 211/70*

U.S. Cl. 546—153 **7 Claims**

1. A process for the preparation of a 2-chloropyridine 3-carboxylic acid ester for the formula:



(I)

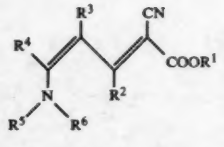
in which

R^1 represents a C_{1-10} alkyl, a C_{2-10} alkenyl or C_{2-10} alkynyl group, each group being optionally substituted by one or more substituents selected from halogen atoms, a C_{1-4} alkoxy, phenyl and napthyl groups; or a C_{3-10} cycloalkyl group optionally substituted by one or more substituents selected from halogen atoms, C_{1-4} alkyl and C_{1-4} alkoxy groups;

R^2 represents a hydrogen atom or a C_{1-6} alkyl or C_{1-6} alkoxy group, each group being optionally substituted by one or more halogen atoms;

R^3 and R^4 independently represent a hydrogen atom or a C_{1-6} alkyl or C_{1-6} alkoxy group, each group being optionally substituted by one or more halogen atoms, or R^3 and R^4 together represent an alkylene group $-(CH_2)_n-$, where n is an integer from 1 to 8, optionally substituted by one or more halogen atoms;

said process comprising the steps of reacting hydrogen chloride with a butadiene derivative of the formula:



(II)

in which R^1, R^2, R^3 and R^4 are as defined above and

R^5 and R^6 independently represent a hydrogen atom, a C_{1-10} alkyl, C_{2-10} alkenyl, or C_{2-10} alkynyl group, each group being optionally substituted by one or more substituents selected from halogen atoms, C_{1-4} alkoxy, phenyl, and naphthyl groups; or a C_{3-10} cycloalkyl, phenyl or naphthyl group, each group being optionally substituted by one or more substituents selected from halogen atoms, C_{1-4} alkyl and C_{1-4} alkoxy groups; or R^5 and R^6 together with the interjacent nitrogen atom represent a 5- or 6-membered heterocyclic ring optionally substituted by one or more substituents selected from halogen atoms, C_{1-4} alkyl and C_{1-4} alkoxy groups.

4,987,233

PROCESS FOR PREPARING HERBICIDAL UREAS AND INSECTICIDAL CARBAMATES AND CARBAMATE DERIVATIVES

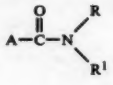
Ralph K. Achgill, and Laurence W. Cali, both of Lafayette, Ind., assignors to Eli Lilly and Company, Indianapolis, Ind.

Filed Jun. 15, 1988, Ser. No. 207,696

Int. Cl.[5] C07D *285/06, 285/08, 285/13, 277/82*

U.S. Cl. 548—140 **16 Claims**

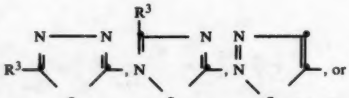
1. A process for preparing a compound of the formula

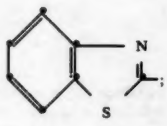


wherein

A is

B is





R is C_1–C_7 alkyl;

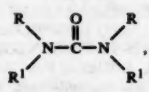
R^1 is H, C_1–C_7 alkyl, C_3–C_7 cycloalkyl, phenyl or C_1–C_4 alkylphenyl;

R^2 is C_1–C_7 alkyl, C_3–C_7 cycloalkyl, C_2–C_7 alkenyl, C_2–C_7 alkynyl, or phenyl optionally substituted with Cl, Br, $-NO_2$-CF_3, C_1–C_4 alkyl, C_1–C_4 alkoxy or $-N(C_1$–C_4 alkyl)$_2$;

R^3 is H, F, Cl, Br, $-CF_3$, C_1–C_7 alkyl optionally substituted with F, Cl, or Br, $-S(O)_n$ C_1–C_7 alkyl, C_1–C_7 alkoxy, C_3–C_7 cycloalkyl optionally substituted with F, Cl, or Br, or phenyl optionally substituted with F, Cl, Br, $-NO_2$, $-CF_3$, or C_1–C_4 alkyl; and

n is 0, 1 or 2;

comprising reacting a nucleophile of the formula A-H, wherein A is as defined above, with at least an equimolar amount of a urea of the formula



wherein each R is independently chosen from R as set forth above, and each R^1 is independently chosen from R^1 as set forth above, in an inert organic solvent at a temperature of from about 100° C. to about 200° C.

4,987,234

PROCESS FOR THE PREPARATION OF CYCLIC UREAS

Hartmut Fischer, Hofheim am Taunus, Fed. Rep. of Germany, assignor to Hoechst Aktiengesellschaft, Frankfurt, Fed. Rep. of Germany

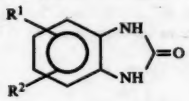
Filed Aug. 15, 1989, Ser. No. 393,999

Claims priority, application Fed. Rep. of Germany, Aug. 17, 1988, 3827867

Int. Cl.[5] C07D 487/00

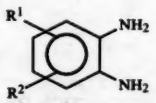
U.S. Cl. 548—305 29 Claims

1. A process for the preparation of cyclic urea derivatives of the formula



(I)

in which R^1 and R^2 are equal or different and represent hydrogen, alkyl having from 1 to 6 carbon atoms or alkoxy having from 1 to 3 carbon atoms, which comprises reacting a 1,2-diaminobenzene of the formula



(II)

in which R^1 and R^2 have the meaning indicated above are reacted with carbon dioxide in the presence of water as the reaction medium under superatmospheric pressure at a temperature of at least 120° C.

4,987,235

ISOINDOLINE DERIVATIVES AND PROCESSES FOR THEIR PREPARATION

Ryosuke Ushijima; Susumu Nakagawa, both of Okazaki, and Eiichi Mano, Kariya, all of Japan, assignors to Banyu Pharmaceutical Co., Ltd., Tokyo, Japan

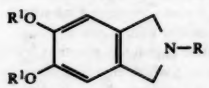
Division of Ser. No. 225,645, Jul. 28, 1988, abandoned. This application Nov. 3, 1988, Ser. No. 267,094

Claims priority, application Japan, Dec. 9, 1985, 60-275196; Dec. 9, 1985, 60-275197; Dec. 18, 1985, 60-283080

Int. Cl.[5] C07D 491/056, 209/044

U.S. Cl. 548—430 1 Claim

1. A compound having the formula:



wherein R is a hydrogen atom a C_{1-4} alkyl group, an alkanoyl group having from 2 to 5 carbon atoms, an aralkyl group having from 7 to 12 carbon atoms, a methanesulfonyl group, an ethanesulfonyl group, a benzenesulfonyl group or a p-toluenesulfonyl group, and R^1 is a hydrogen atom or a hydroxyl-protecting group selected from the group consisting of acetyl, methyl, benzyl and ethoxycarbonyl, or two R^1 groups of adjacent OR^1 groups together form methylene, ethylene or isopropylidene, or a salt thereof.

4,987,236

OPTICALLY ACTIVE ALCOHOLS AND PROCESS FOR PRODUCING THE SAME

Fumie Sato, Fujisawa, Japan, assignor to Nissan Chemical Industries, Ltd., Tokyo, Japan

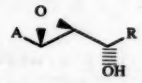
Division of Ser. No. 79,464, Jul. 30, 1987, Pat. No. 4,902,812. This application Nov. 17, 1989, Ser. No. 437,885

Claims priority, application Japan, Jul. 31, 1986, 61-180969; Oct. 31, 1986, 61-260419; Feb. 17, 1987, 62-33615

Int. Cl.[5] C07D 303/04, 303/08; C07F 7/08, 7/22

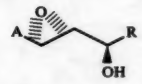
U.S. Cl. 549—208 8 Claims

1. A process for producing an optically active alcohol having a silyl group, stannyl group, or halogen atom at the γ-position, selected from compounds represented by the general formula [I],



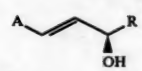
[I]

the general formula [II],



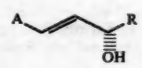
[II]

the general formula [III],



[III]

and the general formula [IV],



[IV]

(where, R denotes a C_1–C_{10} substituted or unsubstituted alkyl group or substituted or unsubstituted phenyl group; A denotes a silyl group represented by

a stannyl group represented by

or a halogen atom. R^1, R^2, and R^3 are substituted or unsubstituted C_1–C_{10} alkyl groups or substituted or unsubstituted phenyl group, which may be the same or different), said process comprising oxidizing transallyl alcohol having a silyl group, stannyl group, or halogen atom at the γ-position, se-

lected from the compounds represented by the general formula [V]

[V]

(where, R denotes a C_1–C_{10} substituted or unsubstituted alkyl group or substituted or unsubstituted phenyl group; A denotes a silyl group represented by

a stannyl group represented by

or a halogen atom. R^1, R^2, and R^3 are substituted or unsubstituted C_1–C_{10} alkyl groups or substituted or unsubstituted phenyl group, which may be the same or different) with hydroperoxide in the presence of titanium tetraalkoxide and optically active tartaric diester.

4,987,238

PROCESS FOR THE PREPARATION OF HIGH-PURITY 5,5'-[2,2,2-TRIFLUORO-1-(TRIFLUOROMETHYL)-ETHYLIDENE]BIS-1,3-ISOBENZOFURANDIONE

Freimund Röhrscheid, Kelkheim, Fed. Rep. of Germany, assignor to Hoechst Aktiengesellschaft, Frankfurt am Main, Fed. Rep. of Germany

Filed Aug. 2, 1989, Ser. No. 395,971

Claims priority, application Fed. Rep. of Germany, Aug. 4, 1988, 3826572

Int. Cl.[5] C07D *261/20*

U.S. Cl. 549—241 14 Claims

1. A process for the preparation of high-purity 5,5'-[2,2,2-trifluoro-1-(trifluoromethyl)-ethylene]bis-1,3-isobenzofurandione (6F dianhydride=6F-DA), which comprises subjecting a concentrated solution of 6F tetracarboxylic acid in water or in dilute acetic acid to the following steps:

(a) treatment of the solution with adsorbents and/or filtering aids, followed by filtration,

(b) treatment of filtrate resulting from step (a) with ion-exchanger,

(c) cooling of the solution treated according to step (b) to form pure 6F tetracarboxylic acid,

(d) filtration of 6F tetracarboxylic acid and

(e) conversion of 6F tetracarboxylic acid to 6F dianhydride, and recovery of 6F dianhydride having a purity of ≧99.5% at a total metal ion content of ≦1 ppm.

4,987,237

DERIVATIVES OF MONOPHOSPHORYL LIPID A

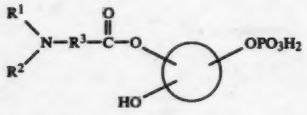
Kent R. Myers, Hamilton, Mont., and Edgar F. Ribi, deceased, late of Hamilton, Mont. by Karin S. Ribi, personal representative , assignors to Ribi ImmunoChem Research, Inc., Hamilton, Mont.

Continuation-in-part of Ser. No. 732,889, May 8, 1985, Pat. No. 4,866,034, which is a continuation-in-part of Ser. No. 526,967, Aug. 25, 1983, abandoned. This application Oct. 22, 1987, Ser. No. 112,742

Int. Cl.[5] C07F *9/655, 9/6558*

U.S. Cl. 549—222 11 Claims

1. A derivative of monophosphoryl lipid A having the formula:



wherein R^1 and R^2 are hydrogen, R^3 is a straight or branched hydrocarbon chain composed of carbon, hydrogen, and optionally oxygen, nitrogen and sulfur which if more than one atom may be the same or different,

wherein the total number of carbon atoms does not exceed 60, and the circle represents a monophosphoryl lipid A nucleus.

4,987,239

PROCESS FOR THE PRODUCTION OF ANHYDRIDES

Ramakrishnan Ramachandran, Allendale; Yagya Shukla, Roselle Park, and Donald L. MacLean, Annandale, all of N.J., assignors to The BOC Group, Inc., Murray Hill, N.J.

Continuation-in-part of Ser. No. 216,037, Jul. 7, 1988, Pat. No. 4,868,330, which is a continuation-in-part of Ser. No. 178,117, Apr. 6, 1988, abandoned, which is a continuation-in-part of Ser. No. 124,731, Nov. 24, 1987, abandoned. This application May 24, 1989, Ser. No. 356,971

Int. Cl.[5] C07D *307/33, 307/89*

U.S. Cl. 549—250 20 Claims

19. A cyclic process for the production of phthalic anhydride comprising:

(a) reacting a hydrocarbon comprising xylenes and naphthalenes, and an oxygen-containing gas in the vapor phase in the presence of an oxidation catalyst in a reactor vessel under conditions, which produce an effluent containing the phthalic anhydride and a gaseous phase containing gaseous products including unreacted hydrocarbon;

(c) recovering said phthalic anhydride from the liquid phase;

(d) introducing the gaseous phase as a pressurized feed into a selective separator to thereby remove a substantial portion of the unreacted reactant hydrocarbon; and

(e) recycling said substantial unreacted reactant hydrocarbon to said reactor vessel, wherein the process is conducted in the presence of a gaseous flame suppressor, the process being controlled so that flame suppression will be maximized at the point in the process where the pressure is increased, the amount of gaseous flame suppressor being such that the gaseous phase formed in step (b) contains from about 30 to about 95 percent by volume thereof.

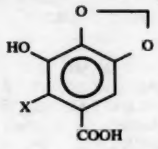
4,987,240

NOVEL BIPHENYL DERIVATIVE AND PRODUCTION AND USE THEREOF

Yoshiyuki Matsuoko; Kunio Hosaka; Shigefumi Takeda, and Hiroshi Mitsuhashi, all of Tokyo, Japan, assignors to Tsumura & Co., Tokyo, Japan

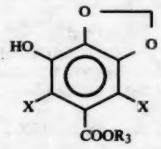
Division of Ser. No. 180,107, Feb. 10, 1988, Pat. No. 4,904,694. This application Nov. 21, 1989, Ser. No. 450,211
Claims priority, application Japan, Jun. 13, 1986, 61-136262; Aug. 5, 1986, 61-182628
Int. Cl.[5] C07D *317/68*
U.S. Cl. 549—436 4 Claims

1. A process for the preparation of a compound having the following formula (V):



(V)

wherein X is a halogen atom, said process comprising reacting a compound having the following formula (IV):



(IV)

wherein R_3 is a hydrogen atom, a methyl group, an ethyl group or a propyl group, with zinc in the presence of a base.

4,987,241

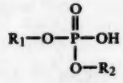
POLYALUMINUM DIALKYL PHOSPHATE, OIL GELLING AGENT COMPRISING THE SAME, AND COMPOSITION FOR EXTERNAL APPLICATION COMPRISING THE SAME

Junichi Fukasawa, Yokohama; Noriko Shirakawa, Kawasaki, and Hisao Tsutsumi, Saitama, all of Japan, assignors to Kao Corporation, Tokyo, Japan

Filed Jan. 25, 1989, Ser. No. 301,120
Claims priority, application Japan, Jan. 29, 1988, 63-19094
Int. Cl.[5] C07F *9/02*
U.S. Cl. 556—174 1 Claim

1. A polyaluminum dialkyl phosphate which is prepared by the reaction of:

(A) a dialkyl phosphate represented by formula (I):



(I)

wherein R_1 and R_2 independently represent an alkyl group of a C_{8-26} carbon atom content, or a salt thereof, and

(B) a basic polyaluminum salt represented by formula (II):

$$Al_m(OH)_nX_1 \cdot kH_2O \quad \text{(II)}$$

wherein X represents an anion having a valency of x other than hydroxyl ion, m represents a positive integer satisfying the equation: $3m=n+xl$, and k represents 0 or a positive integer, in an aqueous medium in which the resulting polyaluminum dialkyl phosphate is insoluble.

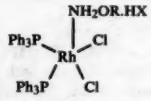
4,987,242

HYDROGENATION CATALYST USEFUL IN THE PRODUCTION OF ALPHA-6-DEOXYTETRACYCLINES

Jagmohan Khanna, 74 Asian Games Village, New Delhi-110049; Kiran Bala, C-107, East of Kailash, New Delhi 110065, and Inder P. S. Grover, E-81 Kalkaji, New Delhi 110019, all of India

Division of Ser. No. 263,721, Oct. 28, 1988, Pat. No. 4,902,447. This application Nov. 29, 1989, Ser. No. 443,586
Int. Cl.[5] C07F *15/00*
U.S. Cl. 556—23 6 Claims

1. A coordination compound useful as a hydrogenation catalyst, and having the formula:



(I)

wherein

Ph is phenyl;

R is hydrogen or C_1–C_4 alkyl; and

X is chloro, bromo or iodo.

4,987,243

NOVEL ANTIPERSPIRANT ADDUCT COMPOSITIONS AND PROCESS FOR MAKING SAME

Antoine Kawam, Washington, D.C.; Shu-Sen Lee, Olney, and Harvey A. Lazar, Silver Spring, both of Md., assignors to The Gillette Company, Boston, Mass.

Filed Mar. 16, 1989, Ser. No. 324,104
Int. Cl.[5] C07F *5/06*
U.S. Cl. 556—27 18 Claims

1. A process for preparing a submicron antiperspirant adduct which comprises:

(i) dissolving a mixture of an aluminum-containing antiperspirant salt and a steric stabilizer in a solvent;

(ii) followed by precipitation of the antiperspirant salt into the steric stabilizer.

4,987,244

ORGANOTIN CATALYSTS FOR USE IN POLYURETHANE SYSTEMS

James D. Nichols, and John B. Dickenson, both of Fogelsville, Pa., assignors to Air Products and Chemicals, Inc., Allentown, Pa.

Filed Sep. 11, 1989, Ser. No. 405,700
Int. Cl.[5] C07F *7/22*
U.S. Cl. 556—89 16 Claims

1. A compound of the formula

$$R_2Sn[X—R^1—OH]_2$$

where

R is a C_1–C_8 alkyl or an aryl group,

R^1 is a C_2–C_9 divalent hydrocarbyl group which may be substituted with a hydroxyl group, and

X is —S— or —O_2C—, provided that when X is —S— and R^1 is an alkylene group, R^1 contains a hydroxyl group.

4,987,245

ORGANOTIN FLUORIDES HAVING CONTROLLED MORPHOLOGY

Lionel Bonneau, Salindres, France, assignor to Rhone-Poulenc Chimie, Courbevoie, France

Filed Oct. 16, 1989, Ser. No. 421,945
Claims priority, application France, Oct. 14, 1988, 88 13529
Int. Cl.[5] C07F 7/22
U.S. Cl. 556—104 22 Claims

1. A process for the preparation of an organotin 2 fluoride having a controlled morphology, comprising reacting a stannic compound with a fluorinating agent, admixing the organotin fluoride thus produced in a solvent that is immiscible with said fluorinating agent but which solubilizes the organotin fluoride therein, subsequently or simultaneously heating the solvent medium to a temperature sufficient to release unreacted fluorinating agent therefrom, and cooling such solvent medium and thereby crystallizing therefrom said organotin fluoride having a controlled morphology.

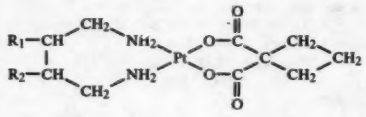
4,987,246

NOVEL PLATINUM COMPLEXES

Hiroyoshi Nowatari; Hiroshi Hayami, both of Takasaki; Yasuo Kuroda, Gunma; Sumio Yoda, Takasaki, and Katsutoshi Takahashi, Tokyo, all of Japan, assignors to Nippon Kayaku Kabushiki Kaisha, Tokyo, Japan

Division of Ser. No. 91,034, Aug. 31, 1987. This application Jun. 27, 1989, Ser. No. 372,246
Claims priority, application Japan, Feb. 19, 1987, 62-34512
The portion of the term of this patent subsequent to Apr. 12, 2005, has been disclaimed.
Int. Cl.[5] C07F 15/00
U.S. Cl. 556—137 2 Claims

1. A diamine platinum (II) complex represented by the formula



wherein R_1 and R_2 are each a C_1–C_4 alkyl group.

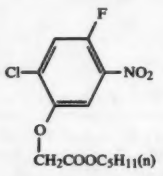
4,987,247

PRODUCTION OF TETRAHYDROPHTHALIMIDE COMPOUND

Yuji Funaki, Toyonaka, and Masayuki Fukushima, Minoo, both of Japan, assignors to Sumitomo Chemical Company, Limited, Osaka, Japan

Division of Ser. No. 239,470, Sep. 1, 1988. This application Sep. 19, 1989, Ser. No. 409,297
Claims priority, application Japan, Sep. 1, 1987, 62-218608; Apr. 27, 1988, 63-107008
Int. Cl.[5] C07C 205/00
U.S. Cl. 560—23 1 Claim

1. A 4-Chloro-2fluoro-5-(pentyloxycarbonylmethyloxy)nitrobenzene compound of the formula:



(III)

4,987,248

ACID CATALYZED FORMATION OF CARBAMATES FROM OLEFINS

Francis J. Waller, Allentown, Pa., assignor to E. I. du Pont de Nemours and Company, Wilmington, Del.

Filed Aug. 2, 1989, Ser. No. 388,401
Int. Cl.[5] C07C 261/00
U.S. Cl. 560—157 26 Claims

1. An improved process for the preparation of N-substituted carbamic acid esters by reacting a carbamic acid ester reactant having two hydrogen substituents on the nitrogen atom with an olefin capable of undergoing cationic polymerization or an alcohol capable of forming a stable carbonium ion in the presence of an acid catalyst wherein the improvement comprises the use of an acid catalyst which is a blend of a perfluorinated sulfonic acid polymer and a perfluorinated polymer diluent in a substantially nonpolar reaction mixture.

4,987,249

2,4-PENTANEDIONE-1,5-DISULFONIC ACID AND METHOD FOR PREPARING THE SAME

Stanley R. Sandler, Springfield, Pa., assignor to Atochem North America, Inc., Philadelphia, Pa.

Filed Sep. 28, 1989, Ser. No. 413,793
Int. Cl.[5] C07C 303/00
U.S. Cl. 562—102 2 Claims

1. 2,4-pentanedione-1,5-disulfonic acid.

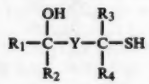
4,987,250

SYNTHESIS OF HYDROXY SULFONIC ACIDS

Dennis E. McGee, LaVerne, and Ted S. Hallen, Placentia, both of Calif., assignors to Union Oil Company of California, Los Angeles, Calif.

Division of Ser. No. 101,146, Sep. 25, 1987, Pat. No. 4,910,330. This application Jan. 19, 1989, Ser. No. 299,728
Int. Cl.[5] C07C 303/00
U.S. Cl. 562—118 22 Claims

1. A process for producing a hydroxy sulfonic acid by the oxidation of a mercaptan selected from the class consisting of hydroxy mercaptans of the formula:



wherein R_1 and R_2 are independently selected from hydrogen, halogen, hydroxy and unsubstituted or substituted cyclic, acyclic, alicyclic, straight or branched chain organic groups, R_3 and R_4 are independently selected from hydrogen and organic groups as defined for R_1 and R_2, and Y is a covalent bond or an organic group as defined for R_1 and R_2, said process comprising the steps of:

(a) adding a reactor an aqueous hydrogen peroxide solution having a concentration below about 40% by weight in an amount equal to between about 20% and about 40% of the stoichiometric ratio based on the total quantity of mercaptan being oxidized, said solution being heated to a temperature below about 75° C.;

(b) adding said mercaptan to said reactor; and

(c) simultaneously adding an additional stream of aqueous hydrogen peroxide into the reactor, the amount of hydrogen peroxide so added, when combined with the hydrogen peroxide previously introduced into the reactor, being an excess of no more than about 10% greater than the stoichiometric amount required to selectively oxidize the mercaptan to a sulfonic acid, the relative rates of said additions being adjusted so that the addition of the hydrogen peroxide is complete before the final addition of the mercaptan is made, with the temperature of the reacting medium being maintained below about 75° C.

4,987,251

PROCESS FOR THE PREPARATION OF TRANS-2,2-DIMETHYL-3-(2,2-DICHLOROVINYL)-CYCLOPROPANECARBOXYLIC ACID

Reinhard Lantzsch, Wuppertal, Fed. Rep. of Germany, and Karl Steinbeck, Leawood, Kans., assignors to Bayer Aktiengesellschaft, Leverkusen, Fed. Rep. of Germany

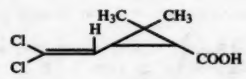
Continuation of Ser. No. 180,410, Apr. 12, 1988, abandoned. This application Oct. 17, 1989, Ser. No. 422,840

Claims priority, application Fed. Rep. of Germany, Apr. 16, 1987, 3712988

Int. Cl.[5] C07C *61/04*

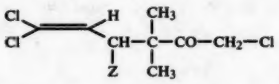
U.S. Cl. 562—506 6 Claims

1. A process for the preparation of trans-2,2-dimethyl-3-(2,2-dichlorovinyl)-cyclopropane-carboxylic acid of the formula (I)



(I)

comprising reacting 1,1,3,6-tetrachloro-4,4-dimethyl-1-hexen-one at a temperature of 10° to 30° C.



(II)

in which Z represents chlorine with an aqueous solution of an alkali metal hydroxide.

4,987,252

QUENCHING PROCESS OF REACTION PRODUCT GAS CONTAINING METHACRYLIC ACID AND TREATMENT METHOD OF QUENCHED LIQUID

Morimasa Kuragano, Sakai; Kozo Iwasaki, Yokohama; Takeshi Isobe; Isao Fukada, both of Takaishi; Minoru Koshibe, Sakai; Yoshihiro Sezaki, Izumi; Hirozo Segawa, and Katsuji Yoguchi, both of Kitakanbara, all of Japan, assignors to Mitsui Toatsu Chemicals, Incorporated and Kyowa Gas Chemical Industry Co., Ltd., both of Tokyo, Japan

Filed Jun. 27, 1988, Ser. No. 211,903

Claims priority, application Japan, Jun. 27, 1987, 62-158825; Jun. 27, 1987, 62-158827; Aug. 5, 1987, 62-194345; Aug. 5, 1987, 62-194346

Int. Cl.[5] C07C *57/07, 57/075, 51/50, 47/22, 45/86, 45/81*

U.S. Cl. 562—600 4 Claims

1. A process for quenching a reaction product gas, which has been obtained by catalytically oxidizing isobutylene, tertiary butanol, methacrolein or isobutyl aldehyde with a molecular oxygen bearing gas in the presence of steam and contains methacrolein and methacrylic acid, with a condensate of the reaction product gas as a cooling medium in a quench column so as to obtain methacrolein and methacrylic acid from the reaction product gas, which comprises:

passing the reaction product gas and a heat-insulating gas through an inner flow passage and an outer flow passage respectively, said inner and outer passages being formed by a double-wall pipe which is constructed of an inner pipe and an outer pipe surrounding the inner pipe and extends through a wall of the quench column;

releasing the reaction product gas from a reaction product gas releasing portion of the quench column toward the surface of a condensate remaining in a bottom of the quench column;

spraying a portion of the condensate, said portion having been cooled in advance, against the reaction product gas released from the reaction product gas releasing portion of the quench column and

recirculating another portion of the condensate to a top of the quench column and causing said another portion of the condensate to undergo counter current contact with the reaction product gas by way of a packing of the quench column.

4,987,253

METHOD FOR THE SYNTHESIS OF DESFERRIOXAMINE B AND ANALOGS THEREOF

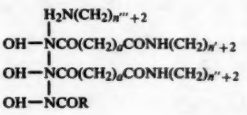
Raymond J. Bergeron, Gainesville, Fla., assignor to University of Florida, Gainesville, Fla.

Continuation-in-part of Ser. No. 246,152, Sep. 19, 1988, which is a continuation-in-part of Ser. No. 206,319, Jun. 14, 1988. This application May 17, 1989, Ser. No. 352,917

Int. Cl.[5] C07C *259/06*

U.S. Cl. 562—623 5 Claims

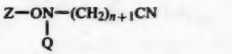
1. A method for synthesizing desferrioxamine B or a homolog thereof having the formula



comprising:

(a) reacting an aldehyde having the formula $NC(CH_2)_nCHO$ (1) wherein n is an integer from 1 to 10 with an aminating agent having the formula $Z—O—NH_2$ wherein Z is an hydroxyl protecting group to produce an oxime having the formula $NC(CH_2)_nCH=NOZ$ (2) and reducing the oxime to produce a hydroxylamine having the formula $NC(CH_2)_{n+1}NHO—Z$ (3), or

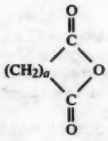
(a-1) reacting an hydroxylamine having the formula Z—ON-H—Q (A), wherein Z is an hydroxyl protecting group and Q is an amino protecting group, with an N-alkylating agent having the formula halo-$(CH_2)_{n+1}CN$, wherein halo is halogen to produce a nitrile having the formula



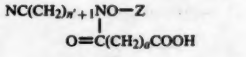
(B)

and cleaving Q therefrom to produce said hydroxylamine (3),

(b) condensing said hydroxylamine (3) with an anhydride having the formula



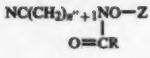
wherein a is an integer from 1 to 6 to produce a compound having the formula



(4)

wherein n' is an integer from 1 to 10,

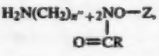
(c) condensing said hydroxylamine (3) with an anhydride having the formula $(RCO)_2O$, wherein R is an alkyl group having from 1 to 10 carbon atoms or an aryl group to produce a compound having the formula



(5)

wherein n'' may be the same as or different from n' and is an integer from 1 to 10,

(d) reducing said compound (5) to produce an amine having the formula



(6)

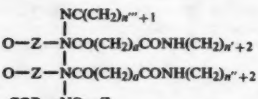
(e) condensing said compounds (4) and (6) to produce a compound having the formula

(7)

(f) reducing said compound (7) to produce an amine having the formula

(8)

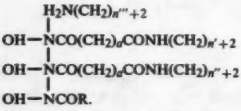
(g) condensing said amine (8) with said compound (4) to produce a nitrile having the formula



(9)

wherein n''' is an integer from 1 to 10 and may be the same as or different from n' and n'', and

(h) reducing said nitrile (9) to produce said hydroxamate having the formula



(10)

4,987,254

FLUORINATED CARBOXYLIC ACID FLUORIDES

Werner Schwertfeger, Langgöns; Klaus Hintzer, Burgkirchen, and Peter Blickle, Kelkheim, all of Fed. Rep. of Germany, assignors to Hoechst Aktiengesellschaft, Frankfurt am Main, Fed. Rep. of Germany

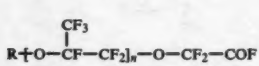
Filed Aug. 3, 1989, Ser. No. 389,367

Claims priority, application Fed. Rep. of Germany, Aug. 6, 1988, 3826807

Int. Cl.[5] C07C *51/62*

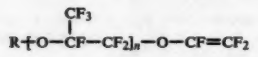
U.S. Cl. 562—851 10 Claims

1. A process for the preparation of a fluorinated carboxylic acid fluoride of the formula I



(I)

in which R denotes a branched or non-branched perfluorinated radical having 1–10 carbon atoms, in which one or more fluorine atoms can be replaced by other halogen atoms or a hydrogen atom, and n is an integer from zero to 10, which comprises reacting a vinyl ether of the formula II



(II)

with R and n according to formula I, with an oxygen-containing gas in the presence of a catalytic amount of a Lewis acid.

4,987,255

ORGANIC NONLINEAR OPTICAL MATERIAL

Tetsuya Tsunekawa; Tetsuya Gotoh, and Keiichi Egawa, all of Otsu, Japan, assignors to Toray Industries, Inc., Tokyo, Japan

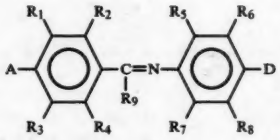
Continuation of Ser. No. 52,595, May 21, 1987, abandoned. This application Jul. 25, 1988, Ser. No. 225,655

Claims priority, application Japan, May 21, 1986, 61-114486

Int. Cl.[5] C07C *291/00, 249/00*

U.S. Cl. 564—119 20 Claims

1. A non-centrosymmetric crystal of a benzylidene-aniline derivative which has a second-order optical nonlinearity of the formula,



said benzylidene-aniline derivative having (1) an electron-donating substituent D of a Hammett substituent constant σp of $\sigma p < 0$ at the 4-position, (2) an electron-accepting substituent A of a Hammett substituent constant σp of $\sigma p \geqq 0$ at the 4'-position, and (3) substituents R_1 through R_9, at least one of which is a molecular alignment-regulating substituent which is a hydrogen-bond forming substituent or which can cause a large steric hindrance, wherein said crystal has a second-order optical non-linearity at least 10 tiomes that of urea.

4,987,256

PROCESS FOR PRODUCTION OF ALPHA-HYDROXYCARBOXYLIC ACID AMIDE

Shuji Ebata; Hiroyuki Hirayama, and Takako Uchiyama, all of Niigata, Japan, assignors to Mitsubishi Gas Chemical Company, Inc., Tokyo, Japan

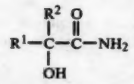
Filed Jul. 9, 1990, Ser. No. 550,150

Claims priority, application Japan, Sep. 7, 1989, 1-230363

Int. Cl.[5] C07C *231/06*

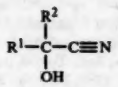
U.S. Cl. 564—126 11 Claims

1. A process for producing α-hydroxycarboxylic acid amide represented by the general formula (A):



(A)

(wherein R^1 is a hydrogen, or an aliphatic hydrocarbon group having 1 to 10 carbon atoms, and R^2 is an aliphatic, alicyclic or aromatic hydrocarbon group having 1 to 10 carbon atoms) from cyanhydrin represented by the general formula (B):



(B)

(wherein R^1 and R^2 are the same as defined above), which process comprises hydrating the cyanhydrin of the general formula (B) by the use of a modified manganese dioxide catalyst containing at least one element selected from zirconium, vanadium, and tin, and containing an alkali metal.

4,987,257

DIACETYLENE COMPOUND HAVING DOUBLE BOND AND SHAPED ARTICLE THEREOF

Katsuyuki Nakamura; Satoru Yamazaki; Jinichiro Kato, and Kensaku Tokushige, all of Nobeoka, Japan, assignors to Director - General of Agency of Industrial Science and Technology, Tokyo, Japan

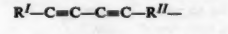
Continuation of Ser. No. 363,330, Jun. 7, 1989, abandoned, which is a continuation of Ser. No. 32,445, Mar. 31, 1987, abandoned. This application Feb. 23, 1990, Ser. No. 484,005

Claims priority, application Japan, May 16, 1986, 61-110908; Jun. 6, 1986, 61-130101

Int. Cl.[5] C07C *233/20*

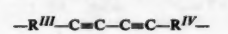
U.S. Cl. 564—153 **7 Claims**

1. A diacetylene compound consisting of the structural units, 1 (a) at least one member selected from the group consisting of a diacetylene derivative of formula (I):



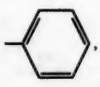
(I)

and a diacetylene derivative of formula (II):

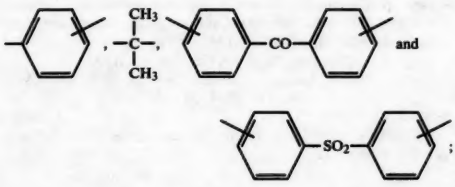


(II)

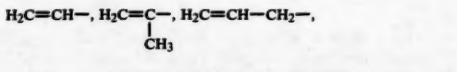
wherein R^I represents a monovalent hydrocarbon group selected from the group consisting of $—CH_3$, $—C_2H_5$ and



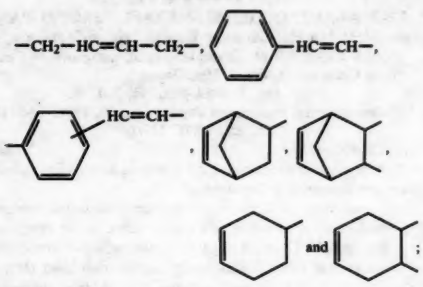
and R^{II}, R^{III} and R^{IV} independently represent a divalent hydrocarbon group selected from the group consisting of $—CH_2—$,



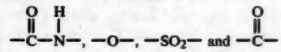
(b) at least one organic group having at least one non-aromatic carbon-to-carbon double bond, selected from the group consisting of:



-continued



(c) at least one connecting group bonded directly to an open valence of each of said structural units (a) and (b), said connecting group (c) being selected from the group consisting of:



wherein at least one (c) group is

2. A diacetylene compound as set forth in claim 1, wherein the molar ratio of the diacetylene derivative (a) represented by the formula (I) or (II) to the double bond-containing organic group (b) is in the range of from 0.2 to 5.

4,987,258

4,4'-DIAMINODIPHENYL COMPOUNDS, PROCESS FOR THEIR PREPARATION AND THEIR USE

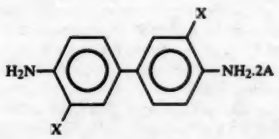
Klaus Hunger, Kelkheim; Heinrich Frölich, Niedernhausen/-Taunus, and Kurt C. Habig, Mörfelden-Walldorf, all of Fed. Rep. of Germany, assignors to Hoechst Aktiengesellschaft, Frankfurt am Main, Fed. Rep. of Germany

Continuation of Ser. No. 844,848, Mar. 27, 1986, abandoned. This application Feb. 20, 1987, Ser. No. 17,062

Int. Cl.[5] C07C *87/50*

U.S. Cl. 564—309 **8 Claims**

1. A non-mutagenic 4,4'-diaminodiphenyl compound of the formula I



(I)

in which X denotes the n-propyl, isopropyl, n-butyl, isobutyl, 1-methylpropyl, n-propoxy, isopropoxy, isobutoxy, 1-methylpropoxy or 2-methoxyethoxy radical and A is 0 or the equivalent of an inorganic acid.

4,987,259

PROCESS OF PREPARING 2,2-BIS(4-AMINOPHENYL)-HEXAFLUOROPROPANE

Masamichi Maruta; Showzou Kaneda; Mineo Watanabe, and Etsuko Katoh, all of Kawagoe, Japan, assignors to Central Glass Company, Limited, Ube, Japan

Filed Jun. 2, 1989, Ser. No. 360,981
Claims priority, application Japan, Jun. 10, 1988, 63-141822
Int. Cl.[5] C07C *321/00*
U.S. Cl. 564—335 7 Claims

1. A process of preparing 2,2-bis(4-aminophenyl)hexafluoropropane, comprising the steps of:

(a) reacting 2,2-bis(4-carboxyphenyl)hexafluoropropane with thionyl chloride at a temperature in the range from 80° to 150° C. in an organic liquid, which is insoluble in water and has a boiling point higher than said temperature, in the presence of a catalyst selected from amines and amides to thereby obtain a solution of 2,2-bis(4-chloroformylphenyl)hexafluoropropane;

(b) mixing the solution obtained at step (a) with an aqueous solution of sodium azide to thereby obtain an acid azide solution;

(c) separating an aqueous phase from said acid azide solution to leave an organic phase and heating said organic phase to a temperature not lower than 80° C. to cause rearrangement of the acid azide to thereby obtain an isocyanate solution;

(d) hydrolyzing said isocyanate solution in sulfuric acid having a concentration of 40–80%, to thereby form a salt of 2,2-bis(4-aminophenyl)hexafluoropropane as an aqueous solution mixed with an organic phase, wherein at least 5 mols of sulfuric acid (as H_2SO_4) per mol of 2,2-bis(4-carboxyphenyl)hexafluoropropane are used; and

(e) separating the aqueous solution formed at step (d) from the organic phase and neutralizing the separated aqueous solution to thereby precipitate 2,2-bis(4-aminophenyl)hexafluoropropane.

4,987,260

PREPARATION OF ANILINES

Mitsuki Yasuhara, and Fujihisa Matsunaga, both of Ichihara, Japan, assignors to Mitsui Petrochemical Industries, Ltd., Tokyo, Japan

Filed Dec. 13, 1988, Ser. No. 283,846
Claims priority, application Japan, Dec. 18, 1987, 62-320806
The portion of the term of this patent subsequent to Jan. 22, 2008, has been disclaimed.
Int. Cl.[5] C07C *209/18*
U.S. Cl. 564—402 2 Claims

1. A process for preparing an niline, comprising reacting a phenol with an amination agent in the presence of a gamma-alumina catalyst wherein

said gamma-alumina catalyst is, without pretreatment, a low alkali alumina consisting essentially of at least 90% by weight of alumina, less than 10% by weight of silica, and up to pb 0.5% by weight of an alkali metal oxide in the dry state,

said catalyst has, without pretreatment, a mean pore diameter in the range of from 30 to 90 angstroms with a standard deviation of 10 to 40 angstroms based on statistical calculation from the pore diameter and pore volume, and

said gamma-alumina catalyst is, without pretreatment, a weakly acidic alumina having a pKa value in the range of from +3.3 to +6.8 as measured with Hammett's indicator and an integrated acid quantity of up to 0.5 meq/gram on the dry basis.

2. The process as set forth in claim 1 wherein said γ-alumina catalyst contains ink bottle-shaped pores in a total pore volume of at least 0.4 c.c./gram on the dry basis.

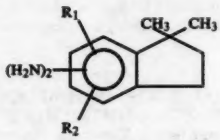
4,987,261

DIAMINOINDANE DERIVATIVES

Keizaburo Yamaguchi, Chiba; Masayuki Ooe, Yokohama, and Akihiro Yamaguchi, Kamakura, all of Japan, assignors to Mitsui Toatsu Chemicals, Inc., Tokyo, Japan

Filed Aug. 15, 1989, Ser. No. 393,797
Int. Cl.[5] C07C *211/04*
U.S. Cl. 564—428 7 Claims

1. A diaminoindane derivative of the formula (I):



(I)

wherein R_1 and R_2 are each selected from the group consisting of a hydrogen atom and a lower alkyl group having from 1 to 4 carbon atoms.

2. The diaminoindane derivative of claim 1 wherein the derivative is selected from

5,7-diamino-1,1-dimethylindane;
4,6-diamino-1,1-dimethylindane;
4,7-diamino-1,1-dimethylindane;
5,7-diamino-1,1,4 -trimethylindane;
5,7-diamino-1,1,6 -trimethylindane;
5,7-diamino-1,1-dimethyl-4-ethylindane;
5,7-diamino-1,1-dimethyl-6-ethylindane;
5,7-diamino-1,1-dimethyl-4-isopropylindane;
5,7-diamino-1,1-dimethyl-6-isopropylindane;
5,7-diamino-1,1-dimethyl-4-n-propylindane;
5,7-diamino-1,1-dimethyl-6-n-propylindane;
5,7-diamino-1,1-dimethyl-4-sec-butylindane;
5,7-diamino-1,1-dimethyl-6-sec-butylindane;
5,7-diamino-1,1-dimethyl-4-n-butylindane;
5,7-diamino-1,1-dimethyl-6-n-butylindane;
5,7-diamino-1,1-dimethyl-4-tert-butylindane;
5,7-diamino-1,1-dimethyl-6-tert-butylindane;
5,7-diamino-1,1,4,6-tetramethylindane;
6,7-diamino-1,1,4,5-tetramethylindane;
5,6-diamino-1,1,4,7-tetramethylindane;
4,7-diamino-1,1,5,6-tetramethylindane;
5,7-diamino-1,1-dimethyl-4,6-diethylindane;
5,7-diamino-1,1-dimethyl-4,6-diisopropylindane; and
5,7-diamino-1,1,4-trimethyl-6-tert-butylindane.

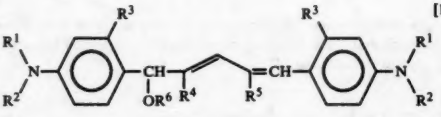
4,987,262

CYCLOALKENE COMPOUNDS USEFUL IN RECORDING MATERIALS

Wakasugi Kazuyuki; Katsumasa Kikkawa; Masahiko Yamaguchi, and Katsuichi Motohashi, all of Tokyo, Japan, assignors to Hodogaya Chemical Co., Ltd., Tokyo, Japan

Filed Sep. 25, 1989, Ser. No. 412,127
Claims priority, application Japan, Oct. 13, 1988, 63-255920
Int. Cl.[5] C07C *211/55*
U.S. Cl. 564—443 3 Claims

1. A cycloalkene compound represented by the following general formula [1]:



[1]

wherein each of R^1 and R^2 is a C_1–C_4 alkyl group, R^3 is a hydrogen atom, or a C_1–C_4 alkyl group, R^4 together with R^5 forms —CH_2—CH_2— or —CH_2—CH_2—CH_2—, and R^6 is a C_1–C_4 alkyl group.

4,987,263

PREPARATION OF 2-METHYLPENTADIAMINE

Georges Cordier, Francheville, France, assignor to Rhone-Poulenc Chimie, Courbevoie, France

Filed Aug. 12, 1988, Ser. No. 231,440

Claims priority, application France, Aug. 12, 1987, 87 11263

Int. Cl.[5] C07C *209/00*; C07D *211/12*

U.S. Cl. 564—491 15 Claims

1. A process for the preparation of 2-methylpentanediamine, comprising selectively liquid-phase hydrogenating less than about 20% by weight of 2-methylglutaronitrile, initially nonammoniacal basic reaction medium in the presence of a catalytically effective amount of a Raney nickel-based catalyst, at a temperature of from 40° C. to 150° C., at a total pressure of less than 40 bars, and said reaction containing not more than 10% by weight of water.

4,987,264

NOVEL POLYPHENOL AND THERMOSETTING PLASTICS PREPARED THEREFROM

Jan Holoch, Leimen; Roland Peter, Mutterstadt; Philipp Eisenbarth, and Thomas Allspach, both of Bad Duerkheim, all of Fed. Rep. of Germany, assignors to BASF Aktiengesellschaft, Ludwigshafen, Fed. Rep. of Germany

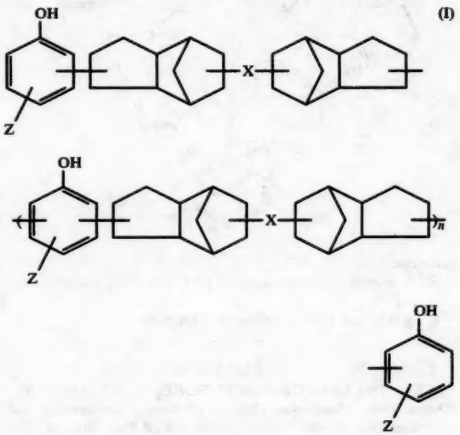
Filed Apr. 21, 1989, Ser. No. 341,471

Claims priority, application Fed. Rep. of Germany, May 4, 1988, 3815050

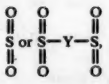
Int. Cl.[5] C07C *147/10*

U.S. Cl. 568—33 12 Claims

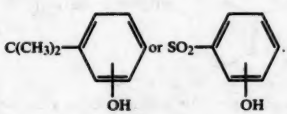
1. A polyphenol compound having the structure



where n is on average from 0 to 5 and



y is an alkylene or arylene group of not more than 15 carbon atoms and Z ios H, Hal, OH, alkyl, aryl, O-alkyl, O-aryl,



4,987,265

PROCESS FOR THE PREPARATION OF BENZALDEHYDE IN THE GAS PHASE

Paul C. Van Geem, Beek, and Ludovicus H. W. Janssen, Geleen, both of Netherlands, assignors to Stamicarbon B. V., Geleen, Netherlands

Filed May 6, 1988, Ser. No. 191,053

Claims priority, application Netherlands, May 6, 1987, 8701063

Int. Cl.[5] C07C *41/00*

U.S. Cl. 568—435 9 Claims

1. Process for the preparation of a substituted or unsubstituted benzaldehyde by hydrogenation of a corresponding substituted or unsubstituted benzoic acid in the gas phase in the presence of a catalyst on an acid carrier, said catalyst comprising an oxide of manganese, prepared by:

(a) coprecipitating at a pH between 7 and 10 a manganese salt and a salt from which an acid carrier is formed;

(b) calcining the coprecipitate obtained in step (a) at a temperature between 300° and 700° C.; and

(c) reducing the calcined coprecipitate obtained in step (b) with a gas comprising hydrogen.

4,987,266

PROCESS FOR THE MANUFACTURE OF NITROPHENETOLE

Richard J. Day, Creve Coeur; Harry B. Harlow, Fenton, and Dennis C. Owsley, St. Louis, all of Mo., assignors to Monsanto Company, St. Louis, Mo.

Filed Dec. 29, 1989, Ser. No. 459,016

Int. Cl.[5] C07C *79/35, 41/16*

U.S. Cl. 568—584 15 Claims

15. A process of preparing p-nitrophenetole by ethoxylation of p-nitrochlorobenzene comprising the steps of:

(a) charging a reaction vessel with p-nitrochlorobenzene, ethanol and N-methylpyrrolidone, the mol ratio of ethanol to p-nitrochlorobenzene being about 5:1 to 1:1 and the mol ratio of N-methylpyrrolidone to p-nitrochlorobenzene being about 4:1 to 1:1;

(b) heating the contents of the reactor to a temperature of about 60°–80° C.;

(c) adding 40–60% aqueous sodium hydroxide dropwise to the mixture of step (a) while sparging the reaction mixture with an oxygen-containing gas to suppress the formation of azo and azoxy by-products wherein the oxygen content is less than about 12% by volume of the gas while maintaining a headspace oxygen content of the reactor at about 1–5%, whereby p-nitrophenetole and a minor amount of p-nitrophenol are produced;

(d) neutralizing the resulting reaction mixture with hydrochloric acid solution;

(e) removing unreacted ethanol from the reaction mixture by distillation;

(f) removing water from the reaction mixture by distillation, whereby sodium chloride is precipitated;

(g) removing the precipitated sodium chloride from the reaction mixture by filtration;

(h) removing n-methylpyrrolidone from the reaction mixture by distillation;

(i) contacting the residue of step (h) with a dilute solution of sodium hydroxide to form an aqueous phase containing the p-nitrophenol and an organic layer of p-nitrophenetole; and

(j) dehydrating the organic layer of step (i) to produce p-nitrophenetole in solid form.

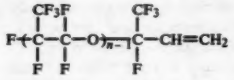
4,987,267

OLIGOHEXAFLUOROPROPYLENE OXIDE COMPOUND TERMINATED WITH VINYL GROUP AT ITS ONE END

Akio Takaoka, Takasaki; Noriyuki Koike, Yoshii, and Hideki Fujii, Annaka, all of Japan, assignors to Shin-Etsu Chemical Co., Ltd., Tokyo, Japan

Filed Jan. 11, 1990, Ser. No. 463,349
Claims priority, application Japan, Jan. 12, 1989, 1-5594
Int. Cl.[5] C07C 43/17
U.S. Cl. 568—615 1 Claim

1. A compound of the formula:



wherein n is an integer of 2 to 5.

4,987,268

PROCESS FOR THE PREPARATION OF ASYMMETRIC TERMINALLY MONO-UNSATURATED GLYCOL ETHERS

Hartwig Rauleder; Hans-Joachim Kötzsch, both of Rheinfelden, and Hans-Joachim Vahlensieck, Wehr, all of Fed. Rep. of Germany, assignors to Huels Aktiengesellschaft, Marl I, Fed. Rep. of Germany

Filed Mar. 12, 1990, Ser. No. 491,774
Claims priority, application Fed. Rep. of Germany, Mar. 17, 1989, 3908792
Int. Cl.[5] C07C 41/05, 41/06
U.S. Cl. 568—616 4 Claims

1. The method of preparing an asymmetric terminally mono-unsaturated glycol ether of the formula

$$R_1—(O—R_3)_n—OR_2 \quad (I)$$

wherein

R_1 is straight or branched alkyl of 1 to 4 carbon atoms,

R_2 is terminally unsaturated alkenyl of 2 to 6 carbon atoms, optionally methyl- or ethyl-substituted,

R_3 is identical or different alkylene groups of 2 to 4 carbon atoms, optionally methyl- or ethyl-substituted, and

n is an integer from 1 to 6, inclusive, by converting a mono-alkyl ether of the formula

$$R_1—(O—R_3)_n—OH \quad (II)$$

wherein R_1, R_3 and n have the meanings previously defined, into an alcoholate with the aid of an alkali metal or alkaline earth metal or an alcoholate, oxide, hydride or hydroxide thereof, and subsequently reacting the alcoholate with a terminally unsaturated alkenyl halide of the formula

$$X—R_2 \quad (III)$$

wherein

X is chlorine, bromine or iodine, and

R_2 has the meanings previously defined, which comprises

(a) reacting two equivalents of (II) with one equivalent of the alcoholate-forming metal component under exclusion of oxygen until its complete conversion into the alcoholate and distilling off the respective labile group,

(b) completely reacting the (II)-alcoholate with one equivalent of (III),

(c) separating the mixture of substances (I) and (II) formed thereby from the precipitated metal halide by filtration or distillation,

(d) reacting the distillate or filtrate with a second equivalent of the alcoholate-former under the conditions of (a),

(e) distilling off the major amount of (I) in the reaction mixture, and

(f) adding another equivalent of (II) to the alcoholate-containing reaction mixture remaining behind after the recovery of (I), allowing the reaction according to (a) to go to completion, and repeating the process steps (a) to (e).

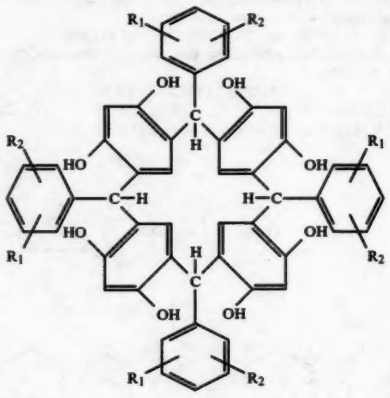
4,987,269

FLAME-PROOF POLYCARBONATES CONTAINING UNITS DERIVING FROM HALOGENATED MACROCYCLIC COMPOUNDS

Alberto Petri, Milan, Italy, assignor to Enichem Tecnoresine S.p.A., Palermo, Italy

Filed Jun. 26, 1989, Ser. No. 371,513
Claims priority, application Italy, Jul. 8, 1988, 21284 A/88
Int. Cl.[5] C07C 39/12
U.S. Cl. 568—720 1 Claim

1. A halogenated macrocyclic compound useful in the preparation of self-extinguishing polycarbonates having the formula:



wherein:

R_1 is selected from hydrogen, OH, chlorine, and bromine; and

R_2 is selected from chlorine and bromine.

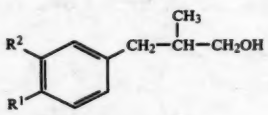
4,987,270

PREPARATION OF 3-ARYLISOBUTYL ALCOHOLS

Kaspar Bott, Mannheim; Herwig Hoffman, Frankenthal, and Walter Scheidmeir, Limburgerhof, all of Fed. Rep. of Germany, assignors to BASF Aktiengesellschaft, Ludwigshafen, Fed. Rep. of Germany

Filed Aug. 23, 1989, Ser. No. 397,883
Claims priority, application Fed. Rep. of Germany, Sep. 3, 1988, 3830019
Int. Cl.[5] C07C 29/34, 27/00
U.S. Cl. 568—905,000 6 Claims

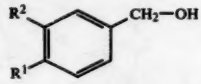
1. A process for the preparation of a 3-arylisobutyl alcohol of the formula I



(I)

where R^1 and R^2 are each hydrogen or an alkyl or cycloalkyl

radical of not more than 8 carbon atoms, wherein an arylcarbinol of the formula II



(II)

is reacted with n-propanol in the presence of a catalytic amount of an alkali metal hydroxide or of an alkali metal alcoholate at from 250° to 350° C. in a closed reaction vessel.

4,987,271

METHOD FOR PURIFYING A POLYOXYALKYLENE ALCOHOL

Takashi Watabe, Yokohama; Hiromitsu Takeyasu, Tokyo; Takao Doi, and Nobuaki Kunii, both of Yokohama, all of Japan, assignors to Asahi Glass Company, Ltd., Tokyo, Japan

Filed Feb. 14, 1990, Ser. No. 480,126

Claims priority, application Japan, Feb. 17, 1989, 64-36306; Feb. 17, 1989, 64-36307

Int. Cl.[5] C07C *37/68, 37/82*

U.S. Cl. 568—621 19 Claims

1. A method for purifying a polyoxyalkylene alcohol, which comprises treating with a treating agent consisting essentially of a pH buffer, a polyoxyalkylene alcohol containing a double metal cyanide complex catalyst, synthesized by ring-opening polymerization of an alkylene oxide in the presence of said catalyst, and then removing the catalyst and the treating agent from the polyoxyalkylene alcohol.

4,987,272

DIPROPARGYL ETHER OF ALPHA, ALPHA'-BIS (4-HYDROXYPENYL)-PARADIISOPROPYLBENZENE

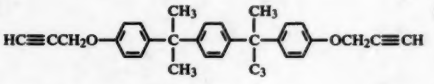
Anthony M. Pigneri, Houston, Tex., assignor to Shell Oil Company, Houston, Tex.

Filed Jul. 28, 1989, Ser. No. 386,079

Int. Cl.[5] C07C *43/215, 43/166*

U.S. Cl. 568—640 1 Claim

1. A compound of Formula I



(I)

4,987,273

PROCESS FOR THE SEPARATION OF A PHENOL

Johan G. A. Bitter; Johannes L. W. C. den Boestert, and Wilhelmus J. M. Weeres, all of Amsterdam, Netherlands, assignors to Shell Oil Company, Houston, Tex.

Filed Nov. 21, 1989, Ser. No. 439,312

Claims priority, application United Kingdom, Nov. 23, 1988, 8827306

Int. Cl.[5] C07C *37/82*

U.S. Cl. 568—758 11 Claims

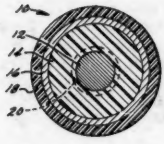
1. A process for the separation of a phenol from a product mixture obtained by the carboxylation of the phenol and containing phenol, an alkali metal phenolate and the carboxylation products therefrom which process comprises at a temperature in the range between 0° C. and 120° C. selectively absorbing the phenol into a first, upstream side of a membrane wall of dense crosslinked elastomer selected from polyisoprene, polybutadiene, organopolysiloxane and fluorosilicon rubbers selectively permeable for phenol while solubilizing the phenol within said membrane, applying pressure to said product mixture on said upstream side of said membrane thereby diffusing said phenol through the membrane, and desorbing the phenol from the second side of said membrane wall.

4,987,274

COAXIAL CABLE INSULATION AND COAXIAL CABLE MADE THEREWITH

Terry L. Miller, Gilbert, Ariz.; William R. Zdanis, Jr., Danielson, Conn.; Graham A. Woerner, Mesa, Ariz., and Allen F. Horn, III, Danielson, Conn., assignors to Rogers Corporation, Rogers, Conn.

Filed Jun. 9, 1989, Ser. No. 364,909
Int. Cl.[5] H01B *11/18, 3/00*
U.S. Cl. 174—102 R 47 Claims



1. In a coaxial cable comprising a central conductor, insulation surrounding the central conductor, and a ground jacket surrounding the insulation, the insulation defining a composite including:

a fluoropolymeric matrix having a weight percent of between about 60 to 25 of the overall composite;

at least one ceramic filler in said fluoropolymeric matrix in a weight percent of between about 40–75 of the overall composite;

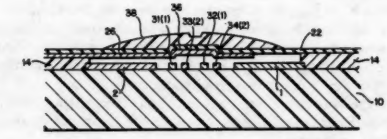
a void content in the composite effective to reduce the dielectric constant of the composite to less than about 2.30.

4,987,275

MULTI-POLE MOMENTARY MEMBRANE SWITCH

Meryl E. Miller, Rancho Palos Verdes; Leroy N. Nopper, Irvine, and David D. Lewis, La Habra, all of Calif., assignors to Lucas Duralith Corporation, Millville, N.J.

Filed Jul. 21, 1989, Ser. No. 382,747
Int. Cl.[5] H01H *1/00, 13/70*
U.S. Cl. 200—5 A 13 Claims



1. A multi-pole momentary contact membrane switch, said switch comprising:

substrate means for defining a dielectric substrate;

membrane means for defining a deflectable membrane overlying at least a portion of said substrate means;

spacer means for spacing said substrate means apart from said membrane means;

a plurality of conductive contact poles on said substrate means, said substrate means including means for insulating said plurality of conductive contact poles from one another;

conductive means for providing a common contact area on at least a portion of said membrane means, said membrane means including stiffening means for locally stiffening a limited portion of said deflectable membrane wherein said stiffening means includes at least one ridge extending from a portion of said deflectable membrane towards said contact poles, said at least one ridge including at least a portion of said conductive means; and

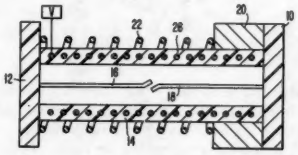
tactile dome means for deflecting said flexible membrane in response to external actuation.

4,987,276

DECELERATION SWITCH

Heinz Bader, Karlshuld, and Georg Sterler, Grobmehring, both of Fed. Rep. of Germany, assignors to Audi AG, Ingolstadt, Fed. Rep. of Germany

Filed Sep. 8, 1989, Ser. No. 404,413
Claims priority, application Fed. Rep. of Germany, Sep. 9, 1988, 3830782
Int. Cl.[5] H01H *35/14*
U.S. Cl. 200—61.45 M 4 Claims



1. A deceleration switch comprising:

a support means;

a first means for producing a first magnetic field mounted on said support means and displaceable between a first position and a second position by inertia caused by a predetermined deceleration of said support means;

means mounted on said support means for biasing said first magnetic field producing means into said first position;

a set of electrical contacts mounted on said support means and operable to close under the influence of the magnetic field of such first magnetic field producing means when said first magnetic field producing means is in said second position; and

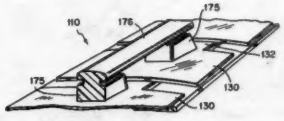
second means for producing a second magnetic field for enhancing said first magnetic field to accelerate the closing of said contacts and prolong the closure time of said contacts, said second means being disposed along said first and second positions, wherein the field strength of said second magnetic field is insufficient independently to close said contacts.

4,987,277

NORMALLY CLOSED PRESSURE-ACTUATED SWITCH

Edward W. Duhon, Setauket, N.Y., assignor to Tapeswitch Corporation of America, Farmingdale, N.Y.

Filed Jan. 31, 1990, Ser. No. 472,710
Int. Cl.[5] H01H *3/02*
U.S. Cl. 200—86 R 23 Claims



1. A normally-closed electrical switch comprising:

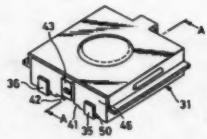
a plurality of electrically conductive contacts normally arranged in overlapping electrical communication,

wherein said contacts are separable in response to an applied pressure which thereby interrupts said electrical communication.

4,987,278
PUSH-BUTTON SWITCH

Jyoji Tsutsumi, Iwaki, Japan, assignor to Alps Electric Co., Ltd., Tokyo, Japan

Filed Feb. 16, 1989, Ser. No. 311,922
Claims priority, application Japan, Apr. 27, 1988, 63-56947[U]
The portion of the term of this patent subsequent to Apr. 3, 2007, has been disclaimed.
Int. Cl.[5] H01H *13/06*
U.S. Cl. 200—294 2 Claims

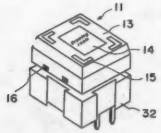


1. In a push-button switch wherein a pair of metal members embedded in an insulating case having a heat resisting property, said insulating case having side walls defining an interior of said case, are partially exposed to the inside of said insulating case to form a pair of fixed contacts while other portions of said metal members are exposed to the outside of said insulating case to form a plurality of connecting terminals adapted to be soldered to a wiring pattern of a printed circuit board to mount said push-button switch on said printed circuit board, and a dummy terminal is provided which is connected to one of said pair of fixed contacts and extends outwardly through a side wall of said insulating case, the improvement wherein a first recess is formed in a lower face of said insulating case beneath said dummy terminal opposite said printed circuit board while a second recess is formed in said first recess and located below said dummy terminal, and a stepped portion having a step with respect to a face of said side wall of said insulating case is provided near said dummy terminal on said face of said side wall of said insulating case.

4,987,279
DISPLAY BUTTON OF PUSH-BUTTON SWITCH

Kenichi Hirose, and Tadao Ichikawa, both of Tokyo, Japan, assignors to Nihon Kaiheiki Industrial Company, Ltd., Japan

Filed Sep. 22, 1989, Ser. No. 410,751
Claims priority, application Japan, Oct. 18, 1988, 63-135078[U]
Int. Cl.[5] H01H *9/18*
U.S. Cl. 200—314 7 Claims

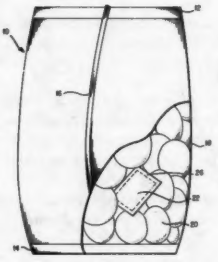


1. A push-button for a switch, said push-button comprising:
means for mounting said push-button, including a plunger, for reciprocating linear motion relative to the switch, along the axis of said plunger;
a display surface on the push-button, said display surface lying in a plane perpendicular to said axis;
a four-sided design display portion provided at approximately the center of said display surface and spaced from the edges of said display surface to define a peripheral portion on said display surface;
a plurality of separate illumination areas located in said peripheral portion of said display surface, said illumination areas including portions located on all four sides of said design display portion, thereby framing said design display portion; and
first illumination means, within the push-button, for illuminating said illumination areas.

4,987,280
METHOD FOR MICROWAVE HEATING OF LOW MOISTURE FOOD PRODUCTS

Hanny Kanafani, Carrollton; Bobby J. Longan, Plano; Paul R. Schmidt, Lewisville, and Lawrence W. Wisdom, Dallas, all of Tex., assignors to Recot, Inc., Dallas, Tex.

Filed Feb. 20, 1990, Ser. No. 483,494
Int. Cl.[5] H05B *6/64*
U.S. Cl. 219—10.55 M 15 Claims



1. A method of heating a low-moisture food product, having a moisture content of less than five weight percent, comprising the steps of:
(a) providing a food product having a moisture content of less than five weight percent;
(b) providing an aqueous solution disposed in a sealed packet which is at least partially transparent to microwave radiation;
(c) disposing the low-moisture food product and the aqueous solution-containing sealed packet in a sealed package, which package is transparent to microwave radiation;
(d) irradiating the sealed package with microwave radiation, causing the aqueous liquid in the sealed packet to volatilize and rupture said packet after less than thirty seconds of exposure to microwave radiation; and
(e) dispersing the volatilized liquid as steam throughout the sealed package so as to increase the temperature of the food product.

4,987,281
APPARATUS FOR CONTINUOUS-DIRECT-RESISTANCE HEATING OF LONG-LENGTH PARTICLES

Yugo Yao, Kanagawa, Japan, assignor to Neturen Company Limited, Tokyo, Japan

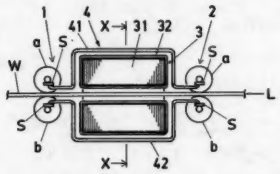
Continuation-in-part of Ser. No. 184,614, Feb. 9, 1989, Pat. No. 4,822,969. This application Feb. 17, 1989, Ser. No. 312,056
Claims priority, application Japan, Nov. 30, 1987, 62-300127
The portion of the term of this patent subsequent to Apr. 18, 2006, has been disclaimed.
Int. Cl.[5] H05B *1/00*
U.S. Cl. 219—50 19 Claims

1. An apparatus for direct-resistance heating of a continuously-fed elongated article, comprising:
first and second roll electrodes disposed in a predetermined spaced apart relation along a feeding path of the elongated article, such that the elongated article can travel along the

feeding path in close contact with peripheral surfaces of said first and second roll electrodes, respectively;

an annular transformer mounted between said first and second roll electrodes such that the feeding path extends through the annulus of said annular transformer;

a primary coil, having a predetermined length, wound about said annular transformer;



conductive members extending between said first and second roll electrodes and extending substantially longitudinally of said annular transformer; and

sliders connecting each respective end of each of said conductive members to a respective one of said first and second roll electrodes; and

wherein the electrical resistance R1 of the elongated article and the electrical resistance R2 of said conducting members are related such that $R1 >> R2$.

4,987,282

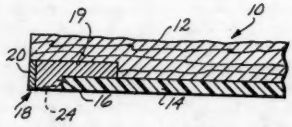
SNOW SKI WITH TREATED METAL EDGE

William P. Chastain, Tacoma, Wash., assignor to K-2 Corporation, Vashon Island, Wash.

Division of Ser. No. 93,082, Sep. 1, 1987, Pat. No. 4,818,839, which is a continuation of Ser. No. 744,046, Jun. 12, 1985, abandoned. This application Apr. 3, 1989, Ser. No. 333,549

Int. Cl.[5] B23K *9/04*

U.S. Cl. 219—76.14 **22 Claims**



1. A snow ski comprising:

(a) top, bottom and side sections;

(b) metal edges on the lower regions of the side sections, the metal edges having side portions and bottom portions; and

(c) a coating of carbide deposited on a lower subportion of the side portions of the metal edges adjacent the bottom portions of the metal edges by:

orienting and conveying the ski longitudinally along a path;

placing an electrode formed at least in part of carbide and with a generally circular external shape on at least one side of the path adjacent the metal edge;

rotating the electrode about an axis extending substantially longitudinally of the metal edge;

creating an electrical arc from the electrode to the metal ski edge to carry and deposit carbide from the electrode onto the metal edge; and,

mounting the rotating electrode in position relative to the metal edge to deposit carbide from the electrode onto the side portion of the metal edge but not any appreciable amount on the bottom portion of the metal edge.

4,987,283

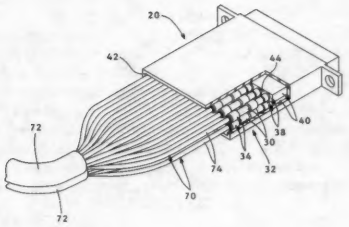
METHODS OF TERMINATING AND SEALING ELECTRICAL CONDUCTOR MEANS

Ernest L. Beinhaur, Harrisburg; Homer E. Henschen, Carlisle; Michael J. McKee, New Cumberland, and Joseph M. Pawlikowski, Lancaster, all of Pa., assignors to AMP Incorporated, Harrisburg, Pa.

Filed Dec. 21, 1988, Ser. No. 287,766

Int. Cl.[5] H05B *6/10*; **B23K** *1/00*

U.S. Cl. 219—85.11 **26 Claims**



1. A method of joining at least one associated pair of first and second conductor means and simultaneously sealing the joint thus formed, comprising the steps of:

providing a source for generating a constant amplitude high frequency alternating current of known frequency;

selecting at least a first conductor means and at least a second conductor means, each said first and second conductor means including respective first and second contact sections extending from respective first and second insulated portions and exposed to be joined in a termination region;

forming a heater means including at least one portion having a length sufficient to extend transversely across said termination region and adjacent said first and second contact sections, said heater means including a first layer of a first metal having low electrical resistance and minimal magnetic permeability and deposited on a major surface thereof a second layer of a second metal having high electrical resistance and high magnetic permeability, said second layer having a thickness approximately equal to one skin depth of said second metal, given said known frequency;

selecting solder material having a nominal melting temperature slightly less than the Curie temperature of said second metal and selecting heat recoverable tubing having a nominal shrinking temperature slightly less than the Curie temperature of said second metal;

positioning each said first and associated second contact section together in paired, adjacent and coextending relationship, placing a preform of said solder material containing flux therefor at least adjacent each said pair of first and second contact sections, and placing a length of said heat recoverable tubing of sufficient diameter around each said solder preform and said pair of first and second contact sections and extending axially therefrom along at least a portion of said first and second insulated conductor portions to first and second tubing ends, defining a pretermination assembly;

disposing said at least a first portion of said heater means across said termination region of said pretermination assembly and at least adjacent outer surfaces of each said length of tubing; and

generating said constant amplitude high frequency alternating current in said heater means for a selected length of time,

whereby a current is generated in said heater means generating thermal energy sufficient to achieve and maintain the Curie temperature of said second layer, the thermal en-

ergy being transmitted radially inwardly through said heat recoverable tubing lengths to said solder preforms adjacent said first and second contact sections melting said solder preforms and forming assured joints between said first and second contact sections, and the thermal energy shrinking said tubing lengths to conform to the outwardly facing surfaces of said joined first and second contact sections and tightly engaging the first and second insulated conductor portions extending therefrom, sealing the joints after which the heater means is removable.

4,987,284

DOWNSTREAM MICROWAVE PLASMA PROCESSING APPARATUS HAVING AN IMPROVED COUPLING STRUCTURE BETWEEN MICROWAVE PLASMA

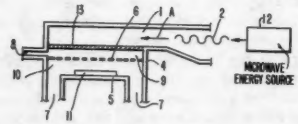
Shuzo Fujimura, Tokyo; Satoru Mihara, Kawasaki; Toshimasa Kisa, Kawasaki, and Yasunari Motoki, Kawasaki, all of Japan, assignors to Fujitsu Limited, Kawasaki, Japan

Continuation of Ser. No. 24,070, Mar. 10, 1987, abandoned. This application Jan. 8, 1990, Ser. No. 462,954

Claims priority, application Japan, Mar. 13, 1986, 61-055447

Int. Cl.[5] B23K *9/00*

U.S. Cl. 219—121.43 **12 Claims**



1. A plasma processing apparatus receiving microwave energy and processing a workpiece, comprising:

a reaction gas source for supplying reaction gas;

a waveguide substantially shaped as a rectangular tube, having a longitudinal axis and side-walls extending in parallel with the longitudinal axis of said waveguide, for receiving the microwave energy propagating in a first direction parallel to the walls of and transferring the microwave energy along the longitudinal axis of said waveguide;

a dielectric window formed in one of the side-walls of said waveguide for transmitting the microwave energy therethrough to an exterior surface thereof;

a plasma generating chamber, formed adjacent to the one of the side-walls of said waveguide to entirely enclose the exterior surface of said dielectric window, said plasma generating chamber offset on the exterior of said waveguide from the one of the side-walls of said waveguide in a direction perpendicular to the longitudinal axis of said waveguide and connected to said reaction gas source, said plasma generating chamber receiving the microwave energy transmitted through said dielectric window and the reaction gas supplied from said reaction gas source and generating a plasma, containing chemical radicals and ions, within said plasma generating chamber;

a reaction chamber coupled to said plasma generating chamber, having a perforated metal plate separating said reaction chamber from said plasma generating chamber, the perforated metal plate formed substantially in parallel with said dielectric window, said reaction chamber receiving the chemical radicals from said plasma generating chamber through the perforated metal plate and protected from the ions by the perforated metal plate; and

a holding stage for mounting the workpiece thereon, said holding stage disposed in said reaction chamber with a top surface of said holding stage substantially in parallel with the perforated metal sheet and reciprocally movable in a direction perpendicular to the perforated metal plate.

4,987,285

PROTECTION CIRCUIT FOR PLASMA-ARC WELDING AND CUTTING EQUIPMENT OPERATED WITH TRANSFERRED OR NON-TRANSFERRED ARC

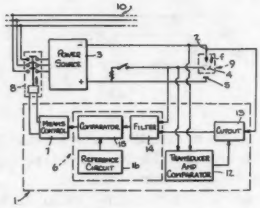
Silvano Dallavalle, Castel S. Pietro, and Raffaele Assaloni, S. Lazzaro di Savena, both of Italy, assignors to Cebora S. P. A., Bologna, Italy

Filed Oct. 24, 1989, Ser. No. 426,731

Claims priority, application Italy, Nov. 15, 1988, 3664 A/88

Int. Cl.[5] B23K *9/00*

U.S. Cl. 219—121.54 **14 Claims**



1. A protection circuit for plasma-arc welding and cutting equipment operating with transferred or non-transferred arc, comprising:

a rectified power source capable of generating a potential difference between separately connected elements such as will sustain in electric arc;

a torch, of which a first element, or electrode, is connected by an electrical conductor to the negative terminal of the power source, and a second element, or nozzle, is connected by an electrical conductor to the positive terminal of the power source;

a further electrical conductor by which a third element, or workpiece, is connected to the positive terminal of the power source in such a way that the arc can be transferred to the workpiece during welding or cutting operations;

means by which to monitor and measure a quantity proportional to the potential difference between said first element and one of said second and third elements and to effect a comparison with a set point, and in the event that the quantity registering is less than the set point, to pilot control means capable of isolating the power source from an electrical power supply, whereby said quantity registers less than the set point when the electrode is in a condition which arises when the electrode has excessive and abnormal wear which will eventually lead to damage to the torch as a whole if the electric arc is continued to be sustained.

4,987,286

METHOD AND APPARATUS FOR REMOVING MINUTE PARTICLES FROM A SURFACE

Susan D. Allen, Iowa, Iowa, assignor to University of Iowa Research Foundation, Iowa, Iowa

Filed Oct. 30, 1989, Ser. No. 429,026

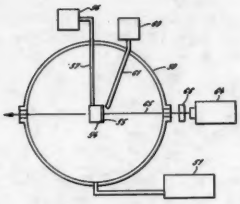
Int. Cl.[5] B23K *26/00*

U.S. Cl. 219—121.68 **23 Claims**

1. A method of removing particles adhered to a surface comprising the steps of:

adsorbing an energy transfer medium into interstices between the particle to be removed and the surface,

irradiating the medium in the interstices with laser energy at a wavelength strongly absorbed by the medium,



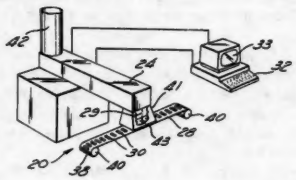
absorbing sufficient energy in the medium to cause explosive evaporation thereof with sufficient force to dislodge the particle.

4,987,287

METHOD OF MAKING A STENCIL FOR ETCHING GLASS

David E. Jack, Irvine, Calif., assignor to Prevent-A-Crime International, Inc., Santa Ana, Calif.

Filed May 12, 1989, Ser. No. 351,425
Int. Cl.[5] B23K *26/00*
U.S. Cl. 219—121.69 **27 Claims**



1. A method comprising:
applying a laser beam to the upper surface of a label, which includes a face stock layer, a layer of releasable adhesive applied to the lower surface of said face stock and a removable liner covering the adhesive; and
producing relative lateral movement between the laser beam and the label to remove the facestock layered and the adhesive layer to create a desired stencil pattern in the label layer while not removing the liner, whereby a stencil is created that may be utilized by removing the liner from the adhesive layer and applying the releasable adhesive layer of the facestock to a surface onto which the desired pattern is to be stenciled.

4,987,288

GAS METAL ARC WELDING WIRE

Donald W. Yonker, Jr., Niles, Mich., assignor to National-Standard Company, Niles, Mich.

Filed Sep. 8, 1989, Ser. No. 404,692
Int. Cl.[5] B23K *35/22*
U.S. Cl. 219—146.1 **6 Claims**

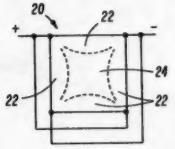
1. An iron based filler wire for use in gas shielded arc welding to provide a weldment, said filler wire being substantially free of rare earth metals including between about 0.05 to 0.09 weight percent carbon, 1.10 to 1.40 weight percent manganese, 0.70 to 1.00 weight percent silicon, 0.00 to 0.025 weight percent phosphorus, 0.00 to 0.025 weight percent sulfur and 0.0 to 0.3 weight percent copper, with said weldment produced in CO_2 shielding gas, possessing an average Charpy V-notch impact of at least 45 ft.-lbs. at −20° F.

4,987,289

LIQUID CRYSTAL DISPLAY HEATING SYSTEM

Gary D. Bishop; Melvin L. Campbell, both of Marion, and James E. Shaw, Cedar Rapids, all of Iowa, assignors to Rockwell International Corporation, El Segundo, Calif.

Filed Jul. 21, 1988, Ser. No. 223,204
Int. Cl.[5] G02F *1/13*; H05B *1/00*
U.S. Cl. 219—209 **7 Claims**



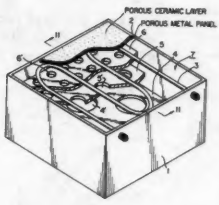
1. A heater for a liquid crystal display (LCD), comprising:
a thin film conductor applied to an LCD;
power supply means connected to said LCD for providing an electrical potential across said thin film conductor; and
a plurality of electrical connectors attached to said thin film conductor at its corner edges for directing electrical current through said thin film conductor so as to provide greater heating near the edges of the LCD.

4,987,290

ELECTRIC PANEL HEATER WITH UNIFORM EMISSIONS OF INFRARED RAYS AND WARM AIR

Tetsuya Okuno, Tokyo, Japan, assignor to Senju Metal Industry Co., Ltd., Tokyo, Japan

Filed Mar. 9, 1989, Ser. No. 321,131
Claims priority, application Japan, Mar. 11, 1988, 63-31547[U]
Int. Cl.[5] H05B *3/00*; F23D *13/00*; F24H *3/04*; F24C *7/00*
U.S. Cl. 392—375 **7 Claims**

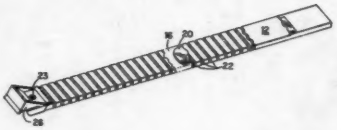


1. An infrared panel heater comprising:
a housing having a gas inlet and a gas discharge opening;
a porous panel which can emit infrared radiation when heated and which covers the gas discharge opening;
a heating element which is disposed inside said housing to the rear of said porous panel; and
a plurality of gas stream-distribution plates which are disposed inside said housing between the gas inlet and said heating element in parallel spaced stacked relationship, each of said gas stream-distribution plates having a plurality of openings formed therein through which a gas can flow transversely, with said openings formed the sole path for the gas from the inlet to the discharge opening, where the openings in each plate are so sized, shaped and distributed and the area of the openings for each plate decreasing in size as the plate are situated closer to the heating element, so that a uniform distribution of gas flow is achieved across the entire area of the porous panel.

4,987,291
HEATER STRAPS

Thomas H. McGaffigan, Half Moon Bay; Rodney L. Derbyshire, Menlo Park, and Douglas Wilkerson, Union City, all of Calif., assignors to Metcal, Inc., Menlo Park, Calif. and AMP Incorporated, Middletown, Pa., a part interest

Filed Nov. 15, 1989, Ser. No. 436,757
Int. Cl.[5] H05B *3/58*
U.S. Cl. 219—549 10 Claims

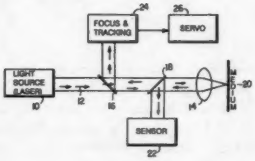


1. An autoregulating heater, comprising:
- a flexible, relatively flat, elongated autoregulating heater strap, having a first region in which resides a first member of high mu material, and a second region that serves as a transmission line between said first region and means for connecting said heater to a source of high frequency constant current,
- a return conductor lying adjacent to and insulated from said first member and extending beyond said first region at least into said second region,
- said return conductor and said first member being enveloped in a conductive sheath along their lengths,
- said conductive sheath having a surface slotted transversely to the length of the strap,
- a conductive strip extending along said second region and into at least the first region of said strap,
- said first member and said return conductor being electrically connected remote from said second region of said strap.

4,987,292
METHOD AND APPARATUS FOR DETECTING FOCUS AND TRACKING ERRORS

James W. Howard, Natick, Mass., assignor to Digital Equipment Corporation, Maynard, Mass.

Filed Jun. 12, 1989, Ser. No. 365,243
Int. Cl.[5] H01J *40/00*
U.S. Cl. 250—201.5 37 Claims

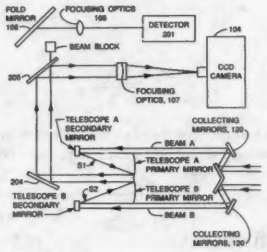


1. Apparatus for measuring the focus of a light beam on a medium comprising:
- a split lens comprising a lens cut into two or more parts along one or more planes and displaced from each other along the plane of the cut;
- a multi section detector comprising multiple light sensors arranged in multiple sections;
- said split lens focusing the light reflected from said medium onto said multi section detector such that the amount of light incident on sections of said detector indicates the focus of said light beam on said medium.

4,987,293
DIGITAL POSITION MONITOR

Mark G. Baciak, West Melbourne, Fla., assignor to The United States of America as represented by the Secretary of the Air Force, Washington, D.C.

Filed Mar. 14, 1990, Ser. No. 493,257
Int. Cl.[5] H01J *40/14*
U.S. Cl. 250—206.1 6 Claims



1. A digital position monitor which intercepts a sample of a laser beam from a laser telescope and which calculates therefrom a measurement of the laser beam's direction with respect to an X and Y plane, said digital position monitor comprising:
- a means for sampling said laser beam from said laser telescope, said sampling means intercepting a portion of said laser beam to produce an optical sample of said laser beam;
- a means for detecting the laser beam's direction, said detecting means receiving and detecting said sample of said laser beam and outputting therefrom first, second, third and fourth analog electrical position indicator signals which indicate said laser beam's direction with respect to said X and Y plane;
- a means for converting analog signals into digital signals which receives and converts said first, second, third and fourth analog electrical position indicator signals respectively into first, second, third and fourth digital position indicator signals;
- a means for calculating said laser beam's direction in said X and Y plane, said calculating means receiving said first, second, third and fourth digital position indicator signals from said converting means, and calculating therefrom a digital X position signal and a digital Y position signal to indicate said laser beam's position in said X and Y plane; and
- a means for converting digital signals into analog signals which receives and converts said digital X and Y position signals to output thereby analog X and Y position signals indicative of said laser beam's direction with respect to said X and Y plane.

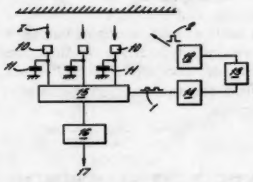
4,987,294
OPTICAL SENSOR WITH PLUAL DETECTORS AND PULSE SANDWICHING

Andrew E. Romer, Bognor Regis, England, assignor to Rosemount Limited, United Kingdom

Filed Aug. 4, 1989, Ser. No. 389,838
Claims priority, application United Kingdom, Aug. 24, 1988, 8820086
Int. Cl.[5] H01J *40/14*
U.S. Cl. 250—208.1 2 Claims

1. An optical sensor comprising a plurality of light-sensitive members each having an individually associated capacitor which is charged with a current dependent upon the incident light sensed by the associated light-sensitive member; a light pulse source providing light pulses from which said incident

light is derived; and a control pulse source providing pairs of consecutive pulses sandwiching the light pulses from the light pulse source, the first of which serves to discharge the capacitor to a reference level prior to issue of a pulse by said light



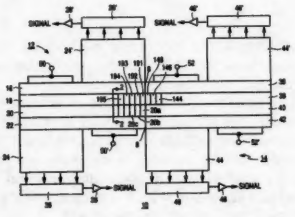
pulse source and the second of which serves to effect read out from the capacitors of the charge thereon deriving from incident light from the preceding light pulse from the light pulse source.

4,987,295

MULTICHIP IMAGER WITH IMPROVED OPTICAL PERFORMANCE NEAR THE BUTT REGION

Kenneth P. Kinnard, Moorestown; Richard T. Strong, Jr., Medford; Samuel Goldfarb, Princeton, and John R. Tower, Medford, all of N.J., assignors to General Electric Company, Moorestown, N.J.

Filed Mar. 31, 1989, Ser. No. 331,137
Int. Cl.[5] H01J *40/14*
U.S. Cl. 250—208.1 **9 Claims**



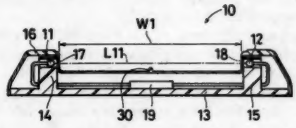
1. A compound imager comprising separate first and second imager submodules, each of said imager submodules including a plate of electromagnetically transparent material having a first index of refraction and defining first and second mutually parallel broad surfaces, and also defining at least a third substantially flat surface orthogonal to said first and second broad surfaces, each of said imager submodules also including a line array of electromagnetic sensors responsive to electromagnetic radiation for producing signal, said line array of sensors of each of said submodules being mounted on said first broad surface and extending thereon substantially to said other surface, said first imager submodule having its third surface contiguous with said third surface of said second imager submodule in such a manner that said line array of sensors of said first submodule is substantially in line with said line array of sensors of said second submodule, whereby a gap may be defined at said contiguous third surfaces because of imperfections thereof, and said electromagnetic radiation illuminating said sensors may cause distortion in the response of sensors near said gap, said compound imager further comprising one of a solid and a liquid substance substantially completely filling said gap, said substance having an index of refraction near said first index of refraction.

4,987,296

RAIN SENSOR WITH IMPROVED AVOIDANCE OF REFLECTED LIGHT

Hideki Kajioka, Akashi; Yasuhiro Fujita, and Keiji Fujimura, both of Kobe, all of Japan, assignors to Fujitsu Ten Limited, Hyogo, Japan

Filed Aug. 10, 1989, Ser. No. 392,269
Claims priority, application Japan, Aug. 11, 1988, 63-106144[U]
Int. Cl.[5] G01V *9/04*; G08B *21/00*
U.S. Cl. 250—222.1 **10 Claims**



1. A rain sensor assembly comprising:

a light transmitting element mounted in means to support said light transmitting element to project above a surface;

a light receiving element mounted in means to support said light receiving element to project above a surface at a position spaced from said light transmitting element such that light transmitted directly from said light transmitting element passes along a rectilinear path spaced above the surface to reach said light receiving element;

said assembly being substantially open and unconfined on opposite sides of said rectilinear path between said support means of said elements above the surface;

such that raindrops are allowed to enter the space between said support means in mutually perpendicular directions, whereby any such raindrop that interrupts said direct light along said path from said light transmitting element reduces the amount of direct light received by said light receiving element; and

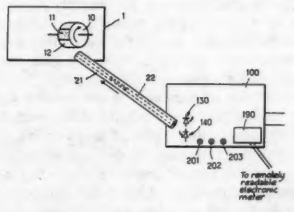
means for preventing incident light transmitted from said light transmitting element along a path directed toward the surface from reflecting from the surface and reaching the light receiving element, said preventing means comprising a portion to be positioned between said elements to project upwardly from the surface to intercept said incident light while not interfering with said direct light along said rectilinear path.

4,987,297

METHOD AND APPARATUS FOR AUTOMATICALLY READING A MECHANICAL FLUID METER

Guy le Squin, Chalon/Saone, and Dominique Laurent, Torcy, both of France, assignors to Gaz De France, Paris, France

Filed Mar. 14, 1989, Ser. No. 323,426
Claims priority, application France, Mar. 14, 1988, 88 03296
Int. Cl.[5] H01J *40/14*
U.S. Cl. 250—227.21 **12 Claims**



1. A method of remotely and automatically reading a me-

chanical fluid meter having graduated rotary elements, the method: comprising the steps of

fitting at least a portion of one of said rotary elements of said meter with a localized light-reflecting element;

transmitting a light beam via a first optical fiber having an outlet end facing said portion of said rotary element;

using a second optical fiber having an inlet end in the vicinity of said rotary element in a zone adjacent to the outlet end of said first optical fiber to pick up light reflected by said rotary element;

detecting light delivered by said second optical fiber at an outlet end thereof;

converting said detected light into an electrical signal;

amplifying said electrical signal;

comparing said electrical signal both with a low level first threshold corresponding to a minimum amount of light being received, and with a high level second threshold corresponding to receiving an amount of light which is greater than the amount which corresponds to normal reflection from said rotary element, but less than the amount which corresponds to reflection by said reflecting element;

triggering an alarm should the electrical signal go below the first threshold;

delivering a pulse each time the electrical signal exceeds the second threshold;

counting the pulses delivered each time the second threshold is exceeded; and

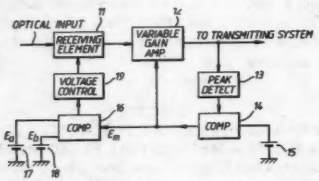
recording said counting in a memory, thereby making it possible for digitally counted information provided by said mechanical fluid meter to be read remotely and automatically at any time.

4,987,298

AUTOMATIC GAIN CONTROL APPARATUS WHICH ADJUSTS BIAS AND GAIN TO MAXIMIZE SIGNAL TO NOISE RATIO

Yoshio Inagaki, Kanagawa, Japan, assignor to Kabushiki Kaisha Toshiba, Kawasaki, Japan

Filed Dec. 6, 1989, Ser. No. 446,662
Claims priority, application Japan, Feb. 9, 1989, 1/28579
Int. Cl.[5] H01J *40/14*
U.S. Cl. 250—214 AG **8 Claims**



1. An apparatus for automatically controlling gain, comprising:

receiving means for receiving optical signals, and for generating electrical signals corresponding to the received optical signals using an adjustable multiplication factor which depends on an applied bias signal;

variable gain control means for amplifying the electrical signals from the receiving means by an adjustable gain;

difference determining means for determining a difference between an electrical signal from the gain control means and a reference signal; and

producing means, responsive to a determined signal indicative of said difference from the difference determining means, for controlling a gain of said variable gain control means and for producing the bias signal such that:

(1) when a value of the determined signal is less than or equal to a first predetermined value, the multiplication factor is set to a first constant value, and said gain of the variable gain control means is controlled corresponding to a level of said received optical signals,

(2) when a value of the determined signal is greater than or equal to a second predetermined value greater than said first predetermined value, the multiplication factor is set to a second constant value less than said first constant value and said gain of the variable gain control means is controlled corresponding to the level of said received optical signals, and

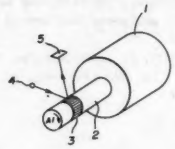
(3) when a value of said determined signal is between said first and second predetermined values, said bias signal is controlled corresponding to said difference, and said gain is controlled corresponding to the level of said received optical signals.

4,987,299

ROTATION QUANTITY MEASURING METHOD AND SYSTEM

Hiroshi Kobayashi, No. 3-15, Hanakoganei, Kodaira-shi, Tokyo; Haruhiko Machida, No. 4-10-7, Nakaochiai, Shinjuku, Tokyo; Jun Akedo, Tokyo, and Hiroyoshi Funato, Chigasaki, all of Japan, assignors to Ricoh Company, Ltd., Tokyo; Hiroshi Kobayashi, Kodaira and Haruhiko Machida, Tokyo, all of, Japan

Filed Aug. 23, 1989, Ser. No. 397,287
Claims priority, application Japan, Aug. 24, 1988, 63-210127
Int. Cl.[5] G01D *5/34*
U.S. Cl. 250—231.14 **20 Claims**



1. A rotation quantity measuring method for measuring a rotation quantity of an object body, said rotation quantity measuring method comprising the steps of:

irradiating a light from a light source on at least one grating pattern which is formed on an outer peripheral surface of a cylindrical body which rotates together with the object body, said grating pattern being made up of gratings which are formed with a constant pitch and which are oriented in a direction which coincides with a rotational direction of said cylindrical body; and

detecting a shadow-like diffraction pattern which is generated by a reflected light received from the grating pattern based on a diffraction caused by the grating pattern and measuring the rotation quantity of the object body based on a positional shift of the shadow-like diffraction pattern as the object body rotates.

4,987,300

OPTICAL-MECHANICAL ROTATION SENSING MECHANISM FOR A WEB-ROLL

Jeffrey C. Robertson, Rochester, N.Y., assignor to Eastman Kodak Company, Rochester, N.Y.

Filed Apr. 9, 1990, Ser. No. 505,961
Int. Cl.[5] G01D *5/34*
U.S. Cl. 250—231.14 **8 Claims**

1. An optical-mechanical rotation sensing mechanism for a photosensitive web-roll mounted for rotation within a cartridge, comprising:

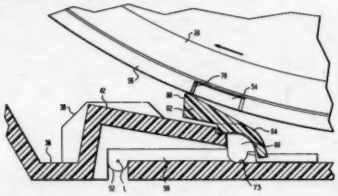
a flange on the web-roll;

activating means on the flange;

optical sensing means disposed outside the cartridge and including a beam of light for sensing incremental rotation of the flange and web-roll;

a flag movably mounted on the cartridge for actuating the sensing means in response to movement of the flag be-

tween a first position, in which the beam of light is interrupted, and a second position, in which the beam of light is uninterrupted; and



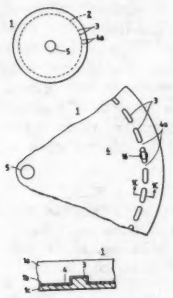
coupling means on the cartridge for coupling the flange activating means to the flag for intermittently moving the flag between its first and second positions.

4,987,301

REFLECTIVE OPTICAL ENCODER DEVICE WITH LIGHT BEAMS APPLIED AS SPATS SPACED BY 2 PREDETERMINED PITCH

Nobuaki Nakamura, Fujieda, Japan, assignor to Victor Company of Japan, Ltd., Japan

Filed Nov. 28, 1989, Ser. No. 442,108
Claims priority, application Japan, Nov. 28, 1988, 63-300084
Int. Cl.[5] G01D *5/34*
U.S. Cl. 250—231.16 **6 Claims**



1. A reflective optical encoder device for detecting an angular or linear speed or position of a movable member, comprising:

an optical encoder movable in response to angular or linear movement of the movable member, said optical encoder having an encoder track composed of a series of equally spaced pits alternating with inter-pit lands therebetween, said pits and said inter-pit lands having equal lengths l;

a light beam pickup for applying three light beams as respective light beam spots to said optical encoder and detecting light beams reflected from the light beam spots on said optical encoder to produce electric signals representative of said encoder track; and

adjacent two of said light beam spots on said optical encoder being spaced at a pitch P expressed by:

$$P = \left(\frac{1.5 + n}{2}\right) l$$

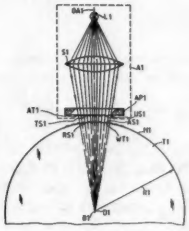
where n is an integer of 1 or more.

4,987,302

PHOTOELECTRIC ANGLE MEASURING APPARATUS WHOSE OPTICALLY PROJECTING FOCAL LINE COINCIDES WITH THE AXIS OF ROTATION OF THE SCALE CARRIER

Hermann Meyer, Weissbach, and Alfons Ernst, Traunreut, both of Fed. Rep. of Germany, assignors to Dr. Johannes Heidenhain GmbH, Traunreut, Fed. Rep. of Germany

Filed Apr. 13, 1989, Ser. No. 337,735
Claims priority, application Fed. Rep. of Germany, Apr. 16, 1988, 3812804; May 28, 1988, 3818218
Int. Cl.[5] G01D *5/34*
U.S. Cl. 250—231.14 **4 Claims**



1. A photoelectric angle measuring apparatus for measuring relative angular positions of two objects which are rotatable relative to each other, the apparatus comprising a scanning unit with a scanning scale connected to one of the objects, and a scale carrier having an axis of rotation, the scale carrier including an angle scale and being connected to the other object, the scanning scale and the angle scale having graduations, the corresponding graduations of the scanning scale and of the angle scale extending parallel to each other, the scanning unit being mounted for scanning the angle scale of the scale carrier, the scanning unit including means for generating a light ray path, wherein

a) the scanning unit includes an optically projecting element for the light ray path, so that the light rays of the light ray path intersect on the axis of rotation of the scale carrier;

b) the scale carrier is cylindrically shaped and has a circumferential surface, the angle scale including parallel graduations placed on the circumferential surface, and wherein the scanning scale is placed on a plane scanning plate, the scanning scale including parallel graduations which extend parallel to the axis of rotation of the scale carrier; and

c) the scanning unit includes a light source, the optically projecting element, the plane scanning plate with the scanning scale and at least one photoelectric cell.

4,987,303

MICRO-DISPLACEMENT DETECTOR DEVICE, PIEZO-ACTUATOR PROVIDED WITH THE MICRO-DISPLACEMENT DETECTOR DEVICE AND SCANNING PROBE MICROSCOPE PROVIDED WITH THE PIEZO-ACTUATOR

Tsugiko Takase, Tokyo; Hideo Adachi, Iruma; Takao Okada, Tokyo; Hisanari Shimazu, Tokyo, and Hideo Tomabechi, Tokyo, all of Japan, assignors to Olympus Optical Co., Inc., Tokyo, Japan

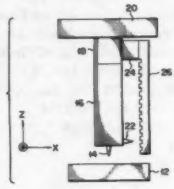
Filed Apr. 4, 1990, Ser. No. 504,538
Claims priority, application Japan, Apr. 7, 1989, 1-88731
Int. Cl.[5] H01J *37/26*
U.S. Cl. 250—306 **8 Claims**

1. A micro-displacement detector device comprising:

a reference sample having a face of which property changes along the face;

a probe located adjacent to the reference sample and moved along the face of the reference sample; and

means for measuring a property change between the probe



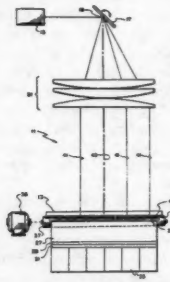
and the face of the reference sample to detect the displacement of the probe relative to the face of the reference sample.

4,987,304

TELECENTRIC SCANNING FOR TRANSPARENT STORAGE PHOSPHORS

Robert W. Kulpinski, Rochester, and Anthony R. Lubinsky, Webster, both of N.Y., assignors to Eastman Kodak Company, Rochester, N.Y.

Filed Sep. 29, 1989, Ser. No. 414,819
Int. Cl.[5] G01N *23/04*
U.S. Cl. 250—327.2 3 Claims



1. Apparatus for scanning a transparent phosphor, said apparatus including a source of stimulating radiation, scanning means, means for supporting said phosphor and a telecentric lens system for directing the stimulating radiation from said source so that it is everywhere perpendicular to the surface of said phosphor.

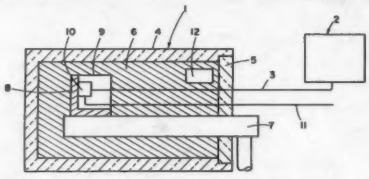
4,987,305

INFRA-RED SENSING SYSTEM

Aharon Bornstein, Holon, and Gideon Cinader, Rehovot, both of Israel, assignors to State of Israel, Atomic Energy Commission, Soreg Nuclear Research Center, Israel

Filed Aug. 23, 1989, Ser. No. 397,382
Claims priority, application Israel, Sep. 1, 1988, 87640
Int. Cl.[5] G01J *5/08, 5/28*
U.S. Cl. 250—352 14 Claims

1. An infrared sensing system having a cooled detector assembly comprising an insulating casing holding a detector chamber with an array of cooled detectors in thermal contact with a cryogenic refrigerator, processor means for processing electric signals generated in the detectors by received and focused infrared radiation, conductor means for conducting said electric signals to said processor means and an infrared radiation focusing system having its focal area outside the casing, which focal area is optically linked to said array of cooled detectors by a bundle of optical fibres having receiving and emitting ends and capable of conducting infrared radiation, the receiving ends of all fibres being located in said focal area and the emitting end of each fibre being directly linked to only one single, associated detector of the array and compris-



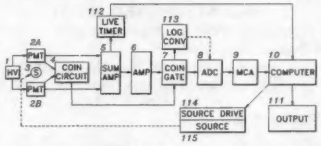
ing said insulating casing being stuffed with thermally insulating material and not being evacuated.

4,987,306

COLOR MONITORING IN LIQUID SCINTILLATION SYSTEMS

Charles L. Dodson, Orange, Calif., assignor to Beckman Instruments, Fullerton, Calif.

Filed Jul. 27, 1989, Ser. No. 386,816
Int. Cl.[5] G01T *1/208, 1/00*
U.S. Cl. 250—362 29 Claims



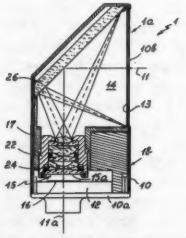
1. A method for determining the existence of color in a sample in a liquid scintillation counter comprising the steps of determining at a predetermined external standard of quench level a system efficiency characteristic of the sample, determining at the predetermined quench level a system efficiency whether there is the existence of a predetermined degree of deviation of the respective system efficiency characteristic, such deviation being indicative of color.

4,987,307

INTRABUCCAL DETECTOR FOR X-RAY APPARATUS

Giorgio Rizzo, Milan; Giuseppe Cilia, Novara, and Cesare Gadda, Pregnana Milanese, all of Italy, assignors to Fiad S.P.A., Trezzano Sul Naviglio, Italy

Filed Oct. 18, 1989, Ser. No. 423,818
Claims priority, application Italy, Oct. 21, 1988, 22394 A/88; Jul. 20, 1989, 21245 A/89
Int. Cl.[5] G01T *1/20;* A61B *6/14*
U.S. Cl. 250—368 12 Claims



1. An intrabuccal detector for X-ray apparatus, comprising: an outer containment enclosure (**10**), a scintillation screen (**13**) adapted to convert emitted X-rays to light signals, a CCD sensor (**16**) adapted to convert said light signals to electric signals, and comprising an optical system (**15**) placed between said scintillation screen (**13**) and said CCD sensor (**16**) and including a plurality of micro-lenses (**15***a*) adapted to concen-

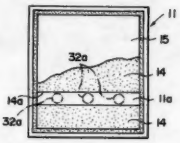
trate said light signals from said scintillation screen (13) onto said CCD sensor (16).

4,987,308

CASSETTE FOR STIMULABLE PHOSPHOR SHEET

Kaoru Tamura, and Shumpeitu Torii, both of Kanagawa, Japan, assignors to Fuji Photo FIlm Co., Ltd., Kanagawa, Japan

Continuation of Ser. No. 572,050, Jan. 19, 1984, abandoned. This application Apr. 11, 1989, Ser. No. 336,520
Claims priority, application Japan, Jan. 21, 1983, 58-8360
Int. Cl.[5] G01T *1/105*
U.S. Cl. 250—484.1 5 Claims



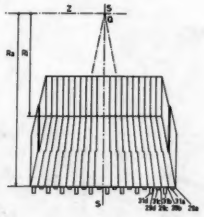
1. In an apparatus for removing a stimulable phosphor sheet from a cassette, said apparatus including sheet taking-out means for removing said stimulable phosphor sheet, said cassette comprising means for housing, exclusively, a single stimulable phosphor sheet for storing a radiation image therein, said cassette further comprising a foamed material positioned so as to surround said single stimulable phosphor sheet in said cassette, said foamed material being secured to an inner surface of a cassette front plate and having at least one notch for exposing a part of said inner surface of said cassette front plate, wherein said notch is positioned near a point at which said sheet taking-out means is positioned.

4,987,309

RADIATION THERAPY UNIT

René Klasen, Rorbas; Hugo Schär, Flasch, and Heinz Vogt, Oberehrendingen, all of Switzerland, assignors to Varian Associates, Inc., Palo Alto, Calif.

Filed Nov. 22, 1989, Ser. No. 440,220
Claims priority, application Switzerland, Nov. 29, 1988, 4427/88
Int. Cl.[5] G21K *1/04*
U.S. Cl. 250—492.1 11 Claims



1. Radiation therapy unit with a beam of rays propagating from a focal point along a beam axis and a radiator head arranged on the beam axis, having the following features:

(a) the radiator head comprises a double-focus multi-leaf collimator;

(b) the multi-leaf collimator exhibits a plurality of adjacently arranged diaphragm plates which in each case have two side faces, two front faces and an inside and an outside face;

(c) means are provided for displacing each individual diaphragm plate; wherein

(d) each side face of each diaphragm plate forms a part of a surface area of a cone, all such cones having both a common cone axis which extends perpendicularly to the beam axis through the focal point and a common cone point which coincides with the focal point, and

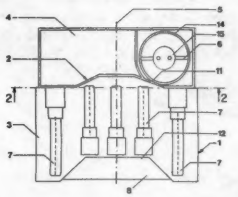
(e) means are provided for guiding the diaphragm plates so that each diaphragm plate performs a pure rotation about the cone axis during its displacement.

4,987,310

POSITIVELY VENTILATED FINGERNAIL IRRADIATION DEVICE

Steffen Oppawsky, Bad Homburg, and Holger Burckhardt, Frankfurt, both of Fed. Rep. of Germany, assignors to Heraeus Kulzer GmbH, Hanau, Fed. Rep. of Germany

Filed Jul. 12, 1989, Ser. No. 378,636
Claims priority, application Fed. Rep. of Germany, Aug. 29, 1988, 3829228
Int. Cl.[5] A61N *5/06*
U.S. Cl. 250—492.1 16 Claims



1. Light system, in particular for curing photopolymerizable plastics on fingernails, having

a housing (1) formed with a partitioning wall (2) defining within said housing a substantially closed air distribution chamber (4) and an irradiation chamber (3), said irradiation chamber being formed with a substantially hand-width opening (8) for generally parallel insertion of fingernails to be irradiated, means for supporting at least one irradiation lamp (7) in said irradiation chamber adjacent said fingernails, and a cover shielding said radiation lamp (7) from eyes of a user;

and a fan (6) for ventilating the irradiation chamber (3), the fan being located at a first airflow orifice in said substantially closed air distribution chamber (4)

wherein said partitioning wall (2) is formed with a plurality of openings (9) defining second airflow orifices in said substantially closed air distribution chamber (4), respective openings being arranged adjacent respective fingernails, said fan (6) is operable to cause airflow between said first and second airflow orifices and thence through said hand-width opening (8); and

wherein, with increasing distance from the fan (6), the cross-sectional area of said openings increases, thereby tending to equalize airflow across respective ones of said fingernails.

4,987,311

ELECTRON-DETECTOR DIODE BIASSING SCHEME FOR IMPROVED WRITING BY AN ELECTRON BEAM LITHOGRAPHY MACHINE

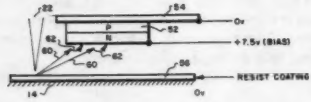
William J. Devore, Hayward, Calif., assignor to Etec Systems, Inc., Hayward, Calif.

Filed Aug. 8, 1989, Ser. No. 391,202
Int. Cl.[5] H01J *37/30*
U.S. Cl. 250—492.2 5 Claims

1. In an electron beam lithography machine with a beam column and having a controlled electron beam capable of writing a pattern on a substrate located beneath the beam column, the improvement in a beam position locating apparatus comprising,

electron detector means which locates the beam position by

responding to backscattered electrons generated by the electron bombardment on said substrate by said electron beam, and



means to reduce or eliminate secondary electrons emitted from said detector in response to said bombardment from reaching said substrate thereby reducing or eliminating a charge buildup on said substrate which would deflect said beam and cause pattern distortion.

4,987,312

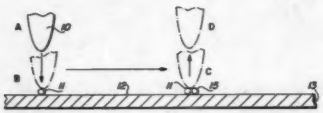
PROCESS FOR REPOSITIONING ATOMS ON A SURFACE USING A SCANNING TUNNELING MICROSCOPE

Donald M. Eigler, Santa Cruz, Calif., assignor to International Business Machines Corporation, Armonk, N.Y.

Filed Nov. 7, 1989, Ser. No. 432,657

Int. Cl.[5] H01J *37/30*

U.S. Cl. 250—492.3 **15 Claims**



1. A method for repositioning an adsorbate atom on a substrate surface, comprising the steps of:

moving the tip of a STM to a position proximate the atom to be moved and then increasing the attraction between the tip and atom by moving the tip closer to the atom; and

while the atom remains bound to the surface, moving the tip laterally to drag the atom to a desired position on the surface.

4,987,313

METHOD OF AND APPARATUS FOR THE STORAGE OF RADIOACTIVE WASTE

Henning Baatz, and Dieter Rittscher, both of Essen, Fed. Rep. of Germany, assignors to GNS Gesellschaft fur Nuklear-Service mbH, Essen, Fed. Rep. of Germany

Continuation-in-part of Ser. No. 505,227, Jun. 17, 1983, Pat. No. 4,894,550. This application Aug. 1, 1989, Ser. No. 388,827

Claims priority, application Fed. Rep. of Germany, Jun. 18, 1982, 3222764

The portion of the term of this patent subsequent to Jan. 16, 2007, has been disclaimed.

Int. Cl.[5] G21F *5/00*

U.S. Cl. 250—506.1 **11 Claims**

1. A method of storing radioactive waste, comprising the steps of:

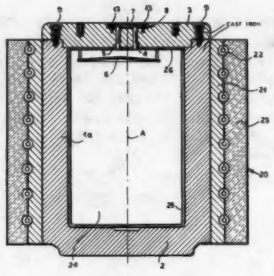
(a) providing an upwardly open cast-iron vessel having a closed bottom, a solid wall unitary therewith and an upwardly open mouth;

(b) closing said mouth by sealing engaging a cast-iron lid thereof, said lid being formed with separate vertically throughgoing intake and outlet passages and providing in said vessel at least one flow deflector aligned beneath said outlet passage;

(c) surrounding said vessel with a heating jacket;

(d) introducing into said vessel through said intake passage a radioactive liquid;

(e) evacuating said vessel through said outlet passage and simultaneously heating said vessel with said jacket to evaporate liquid from said vessel and form vapors which are withdrawn past said deflector through said outlet passage; and



(f) upon completion of filling of said vessel with a residue resulting from the evaporation of liquid from the contents of said vessel, hermetically engaging a cover over said passages.

4,987,314

ACTUATOR APPARATUS UTILIZING A SHAPE-MEMORY ALLOY

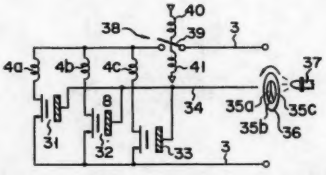
Masakazu Gotanda, Kanagawa, and Yasuhiro Ueda, Kokubunji, both of Japan, assignors to Olympus Optical Co., Ltd., Tokyo, Japan

Continuation of Ser. No. 464,630, Jan. 3, 1990, abandoned, which is a continuation of Ser. No. 308,808, Feb. 9, 1989, abandoned. This application May 11, 1990, Ser. No. 522,464

Claims priority, application Japan, Apr. 21, 1988, 63-99043; May 30, 1988, 63-70291[U]

Int. Cl.[5] G02B *27/00*

U.S. Cl. 250—551 **25 Claims**



1. An actuator apparatus comprising:

a plurality of actuators each comprising a shape-memory alloy;

power supply line means for supplying power to said actuators;

power supply control means connected in series with at least one of said actuators; and

driving means for driving said power supply control means.

4,987,315

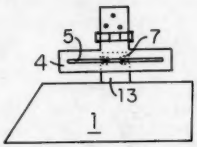
HINGE MOUNTED AND SLIDABLE SUN VISORS

Ibrahim K. Abu-Shumays, and Mary D. Abu-Shumays, both of 1248 Varner Rd., both of Pittsburgh, Pa. 15227

Continuation-in-part of Ser. No. 451,937, Dec. 18, 1989, which is a continuation-in-part of Ser. No. 387,784, Aug. 1, 1989, Pat. No. 4,919,468, which is a continuation-in-part of Ser. No. 158,846, Feb. 22, 1988, abandoned. This application Apr. 16, 1990, Ser. No. 509,191

Int. Cl.[5] B60J *3/02*

U.S. Cl. 296—97.11 1 Claim



1. A sun visor mounted by means of a hinge to the top part of an automobile; said hinge makes it possible to rotate said visor between a top stored position and a lowered used position;

said hinge is comprised of (a) a pin which acts in part as a pivot, and (b) two plates having plane faces and having cylindrical parts surrounding the pin;

said cylindrical parts of the plates surrounding the pin act as clamps and are (a) sufficiently loose around the pin to allow rotation of the visor with little tension, yet (b) sufficiently tight to hold the plates and visor in any position following partial rotations;

said visor has a visor plate along one of its sides; said visor plate is an integral part of said visor and has a plane face parallel to a face of said visor; said visor plate is mounted to a plate of the hinge; one of the said visor plate and said plate of the hinge has a slit therein in order for the visor plate and the visor to slide easily in a horizontal direction.

4,987,316

PASSENGER RESTRAINT FIRING CIRCUIT

Craig W. White, Grosse Pointe, and Kevin E. Musser, Farmington, both of Mich., assignors to Automotive Systems Laboratory, Inc., Farmington Hills, Mich.

Filed Oct. 3, 1989, Ser. No. 414,668

Int. Cl.[5] B60R *21/16*

U.S. Cl. 307—10.1 21 Claims

1. A firing circuit for actuating a first and second vehicle passenger restraint comprising

four parallel circuit legs connected across a battery via a first diode placed in series therewith, the cathode of said first diode being grounded to said battery;

said first and second circuit legs each including in series

a diode

a normally-open safing sensor connected to the cathode of the diode of said circuit leg,

a trigger means having an internal resistance for deploying one of said restraints, and

a normally-open crash sensor,

the safing sensors and crash sensors of each of said first and second circuit legs being shunted by resistors having a nominal resistance substantially greater than the internal resistance of said trigger means;

said third and fourth circuit legs each comprising in series;

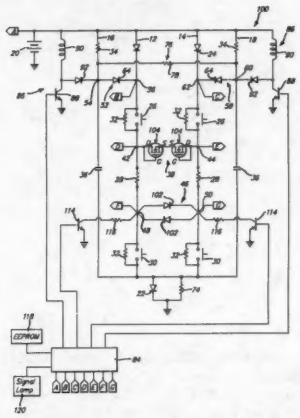
a current-limiting device from the group consisting of resistors and diodes, and

a capacitor;

a first bridge connecting said first circuit leg with said second circuit leg between the diodes and the safing sensors thereof, respectively, said first bridge including a current-limiting device;

a second bridge connecting said first circuit leg with said second circuit leg between the trigger means and the crash sensors thereof, respectively;

a third bridge connecting said third circuit leg between the current-limiting device and the capacitor thereof with said first circuit leg between the diode and the safing sensor thereof, said third bridge including a diode, the cathode of the diode of said third bridge facing said first circuit leg; and



a fourth bridge connecting said fourth circuit leg between the current-limiting device and the capacitor thereof with said first circuit leg between the diode and the safing sensor thereof, said fourth bridge including a diode, the cathode of the diode of said fourth bridge facing said second circuit leg.

4,987,317

SYSTEM FOR PUTTING ELECTRONIC UNITS CONNECTED TO A COMMUNICATIONS CHANNEL INTO AN OPERATIONAL STATE OR INTO A STAND BY STATE

Michel A. Pournain, Leguevin; Jean-Pierre A. Loncle, Muret, and Francis J. Colombie, Toulouse, all of France, assignors to Siemens-Bendix Automotive Electronics, Toulouse, France

Filed Jan. 30, 1989, Ser. No. 303,869

Claims priority, application France, Feb. 5, 1988, 88 01330

Int. Cl.[5] H04B *1/16*; G06F *1/00*

U.S. Cl. 307—40 8 Claims

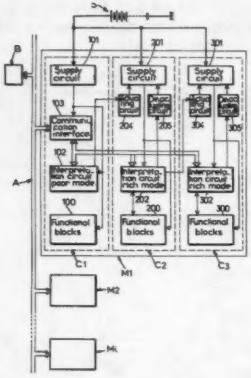
1. In a system for selectively switching electronic units capable of transmitting or receiving messages in at least a first format by means of a communications channel, into an operational state or into a standby state, characterized in that the system comprises means (B, M) of transmitting a message on the communications channel (A), in a second format which is distinct from the first format, for selectively switching the units (M) into an operational state, each unit (M) comprises:

communication interface means (**103**) operatively connected to the communication channel for transmitting and receiving messages in either the first or second format;

first interpretation means (**102**) operatively connected to said communication interface means for interpreting said messages transmitted in said second format in order to at least command the switching on of at least a portion (**200, 202; 300, 302**) of the circuits of the unit in response to the recognition of said message for switching the selected unit into an operational state,

second interpretation means (**202; 302**) operatively connected to said communication interface means for interpreting the messages transmitted in said first format in order to command at least the switching off of at least a

portion (200, 202: 300, 302) of the circuits of said unit in response to the recognition of a message for the switching off of this portion of the circuits transmitted in said first format, said second interpretation means being part of the



circuits whose switching on is commanded by said first interpretation means, and

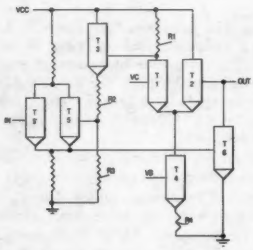
a power supply circuit (101) for supplying power to said first interpretation means (102) independently from the messages transmitted on the communications channel (A).

4,987,318

HIGH LEVEL CLAMP DRIVER FOR WIRE-OR BUSES

Ronald D. Burke, and Carl J. Mattes, both of Manasssas, Va., assignors to International Business Machines Corporation, Armonk, N.Y.

Filed Sep. 18, 1989, Ser. No. 408,978
Int. Cl.[5] H03K *17/16, 19/092*
U.S. Cl. 307—443 **10 Claims**



2. A positive clamped bus driver circuit comprising:

a first differential amplifier including a first NPN bipolar transistor having its collector connected through a first impedance to a positive power supply potential, its emitter connected through a second impedance to a ground potential and its base connected to a clamping voltage input, said first differential amplifier further including a second NPN bipolar transistor having its collector connected to said positive power supply potential, its emitter connected through said second impedance to said ground potential and its base connected to an output bus;

an output driver NPN bipolar transistor having its collector connected to said output bus, its emitter connected to said ground potential, and its base connected to a first node;

a second differential amplifier which includes a first NPN bipolar transistor having its collector coupled to said first positive power supply potential, its emitter connected to said first node and coupled through a third impedance to said ground potential and its base coupled to said collector of said first bipolar transistor in said first differential amplifier, said second differential amplifier further including a second NPN bipolar transistor having its collector coupled to said positive power supply potential, its emitter coupled through said third impedance to said ground potential and its base connected to a binary voltage signal source;

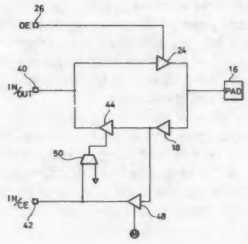
said first differential amplifier operatively controlling said first node of said second differential amplifier to govern the conductivity of said output driver to clamp the potential of said bus to substantially said clamping voltage value.

4,987,319

PROGRAMMABLE INPUT/OUTPUT CIRCUIT AND PROGRAMMABLE LOGIC DEVICE

Keiichi Kawana, Chiba, Japan, assignor to Kawasaki Steel Corporation, Hyogo, Japan

Filed Sep. 6, 1989, Ser. No. 403,443
Claims priority, application Japan, Sep. 8, 1988, 63-225276
Int. Cl.[5] H03K *19/177*
U.S. Cl. 307—465 **9 Claims**



1. A programmable input/output circuit for use in a programmable integrated circuit, for interfacing between an external circuit of the integrated circuit and an internal logic circuit of the same, the programmable input/output circuit comprising:

(a) an input/output terminal connected to a bus of the internal logic circuit;

(b) an input terminal connected to a programmable wiring of the internal logic circuit;

(c) a tri-state input buffer means for transmitting an input signal fed externally of the circuit to any one of said input-/output terminal and said input terminal, and

(d) a tri-state output buffer means for transmitting externally of the circuit an output signal from the internal logic circuit fed to said input terminal.

4,987,320

MULTIPHASE MULTIPLIER

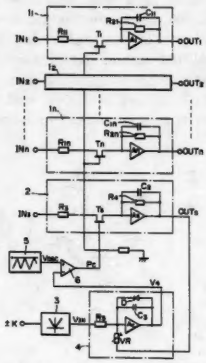
Kenji Oshima, Narita, and Yasutami Kito, Haruhi, both of Japan, assignors to Otis Elevator Company, Farmington, Conn.

Filed May 22, 1989, Ser. No. 355,516
Int. Cl.[5] H03K *5/22, 5/00*
U.S. Cl. 307—498 **5 Claims**

1. A multiplier circuit, comprising;

a plurality of multipliers, each responsive to a corresponding one of a plurality of input signals, including a reference signal, and each responsive to a duty cycle control signal for providing a plurality of corresponding multiplied input signals, including a multiplied reference signal; and

a duty cycle adjusting means, responsive to said multiplied reference signal, for comparing the magnitude of said



multiplied reference signal to the magnitude of a multiplier signal for providing said duty cycle control signal in proportion to the difference therebetween.

4,987,321

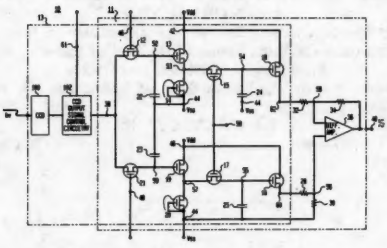
PROCESSING CIRCUIT FOR IMAGE SENSOR

William J. Toohey, Pittsford, N.Y., assignor to Eastman Kodak Company, Rochester, N.Y.

Filed Sep. 25, 1989, Ser. No. 412,065

Int. Cl.[5] H03K *5/00, 5/159;* **H01G** *1/00*

U.S. Cl. 307—520 **4 Claims**



1. Circuitry comprising:

first, second third and fourth sample and hold circuits each having a control terminal, an input terminal and an output terminal;

the input terminals of the first and second sample and hold circuits being coupled together to a circuitry input terminal;

first and second buffer circuits each having an input terminal and an output terminal;

the output terminal of the first sample and hold circuit being coupled to the input terminal of the first buffer circuit;

the output terminal of the second sample and hold circuit being coupled to the input terminal of the second buffer circuit;

the output terminal of the first buffer circuit being coupled to the input terminal of the third sample and hold circuit;

the output terminal of the second buffer circuit being coupled to the input terminal of the fourth sample and hold circuit;

first and second essentially identical source followers each having a control terminal and an output terminal;

the output of the third sample and hold circuit being coupled to the control terminal of the first source follower;

the output terminal of the fourth sample and hold circuit being coupled to the control terminal of the second source follower;

subtraction means, which has a first input coupled to the output of the first source follower, has a second input coupled to the output of the second source follower and has an output coupled to a circuitry output terminal, for during operation of the circuitry subtracting signals appearing on the outputs of the source followers from each other to generate an output signal which is the difference between signals appearing on the output terminals of the source followers; and

the sample and hold circuits, the buffer circuits, and the source followers being formed on a common semiconductor body which does not include the subtraction means.

4,987,322

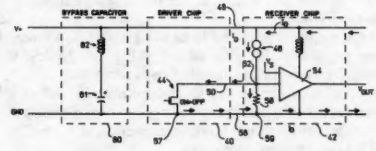
DRIVER-RECEIVER PAIR FOR LOW NOISE DIGITAL SIGNALING

Richard L. Wheeler, San Jose, Calif., assignor to Hewlett-Packard Company, Palo Alto, Calif.

Filed Apr. 7, 1989, Ser. No. 335,010

Int. Cl.[5] H03K *19/092, 3/01*

U.S. Cl. 307—270 **9 Claims**



1. A digital signaling circuit comprising,

a driver circuit at a first location having switching means operative when in a closed-circuit configuration to provide a relatively low-impedance flow path for an electrical signal between a first end of a signal line and a ground plane and when in an open-circuit configuration to interrupt said flow path, and

a receiver circuit at a second location spaced a distance from the first location having sense means operative to sense a voltage level between a second end of the signal line and the ground plane, the receiver circuit including:

a constant current source which draws electrical power from a power supply plane and which is operative to provide an electrical signal to the signal line, and

terminating impedance means operative to provide a relatively high-impedance flow path between the second end of the signal line and the ground plane,

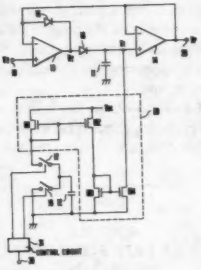
whereby when the switching means is in an open circuit configuration the signal flows through the impedance means to the ground plane, developing a relatively high first voltage level between the signal line and the ground plane and when the switching means is in a closed circuit configuration the signal flows through the signal line and the switching means to the ground plane, developing a relatively low second voltage level between the signal line and the ground plane, the signal having approximately the same magnitude when the high voltage is being developed and when the low voltage is being developed, the constant current source tending to isolate the power supply plane from any switching transients which result from charging or discharging stray impedances associated with the signal line.

4,987,323

PEAK VOLTAGE HOLDING CIRCUIT

Tsuneo Fujita, Tokyo, Japan, assignor to NEC Corporation, Japan

Filed Jul. 27, 1989, Ser. No. 385,818
Claims priority, application Japan, Aug. 8, 1988, 63-198310
Int. Cl.[5] H03K 5/00, 5/153
U.S. Cl. 307—351 5 Claims



1. A peak voltage holding circuit having:
input means for inputting an analog voltage said input means having an output side;
a voltage holding capacitor, having one end connected to an output side of said input means and an other end connected to a first potential, for holding a peak value of the analog voltage;
leakage means, connected in parallel with said voltage holding capacitor, for gradually leaking the analog voltage held by said voltage holding capacitor; and
output means, connected to the output side of said input means, for outputting the peak value of the analog voltage held by said voltage holding capacitor, wherein
said leakage means comprises:
a first-stage mirror circuit having one end connected to a second potential and having another end;
a second-stage mirror circuit, having one end connected to the output side of said input means and another end connected to the first potential, for causing a current corresponding to a current which flows through said first-stage mirror circuit to flow out from said voltage holding capacitor;
a selecting circuit connected to the other end of said first-stage mirror circuit;
a capacitor having one end connected to said selecting circuit and another end connected to the first potential; and
a control circuit, connected to said selecting circuit, for controlling an operation of said selecting circuit,
said selecting circuit alternately connecting one end of said capacitor to the other end of said first-stage mirror circuit and the first potential at every arbitrary period.

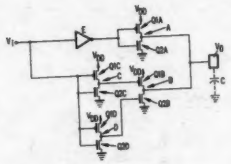
4,987,324

HIGH-SPEED CMOS BUFFER WITH CONTROLLED SLEW RATE

Anthony Y. Wong, Cupertino, and Robert M. Walker, III, Atherton, both of Calif., assignors to LSI Logic Corporation, Milpitas, Calif.

Continuation of Ser. No. 725,463, Apr. 22, 1985, abandoned.
This application Aug. 27, 1987, Ser. No. 90,273
Int. Cl.[5] H03K 19/094, 17/16, 3/01, 17/687
U.S. Cl. 307—451 9 Claims

1. A high-speed CMOS output buffer comprising:
a first circuit network comprising a first control inverter and a first output inverter coupled to the output of said first control inverter;
a second circuit network comprising a second output inverter coupled in parallel to said first output inverter, a second control inverter and a third control inverter the input of, said second output inverter being coupled to the outputs of said second and third control inverters;
output means including a load capacitor coupled to the output of said first and second output inverters;
means for applying an input signal having rising and falling portions to said first, second and third control inverters, so that during the rising portion of said input signal said load capacitor is first charged slowly by said first circuit network and then by said second circuit network and during



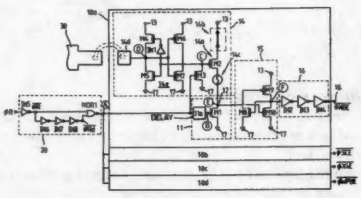
the falling portion of said input signal, said capacitor is partially discharged slowly by said first circuit network and then fully discharged slowly by said second circuit network, wherein the switching threshold voltage of said first control inverter is less than the switching threshold voltage of said second control inverter and greater than the switching threshold voltage of said third control inverter, the values of said threshold voltages of said control inverters causing each of said output inverters to provide in sequence a partial output of the total output to said load capacitor.

4,987,325

MODE SELECTING CIRCUIT FOR SEMICONDUCTOR MEMORY DEVICE

Seong-Mo Seo, Seoul, Rep. of Korea, assignor to SamSung Electronics Co., Ltd., Kyung Ki-Do, Rep. of Korea

Filed Jul. 13, 1989, Ser. No. 379,240
Claims priority, application Rep. of Korea, Jul. 13, 1988, 88-8700[U]
Int. Cl.[5] H03K 17/693
U.S. Cl. 307—465 20 Claims



1. A mode selecting circuit for semiconductor memory device, comprising one or more mode selection signal generating means, each of said mode selection signal generating means having:
inverter means for inverting a reset signal;
mode selecting means for determining, during a chip manufacturing process, the connection between a first power source terminal and an inverter output node coupled with an output terminal of the inverter means the output resistance of said inverter means being sufficiently larger than that of said mode selecting means so as to keep the inverter output node in a high state regardless of the operation of the inverter means in response to said reset signal

when the first power source terminal is connected to said node;

first latch means for latching a low signal when said first power source terminal is connected to said inverter output node, and for latching a high signal by means of an initially supplied and inverted said reset signal when said first power source terminal is not connected to said inverter output node; and

output buffer means for buffering the output of said first latch means.

4,987,326

SEMICONDUCTOR INTEGRATED CIRCUIT DEVICE HAVING AN IMPROVED COMMON WIRING ARRANGEMENT

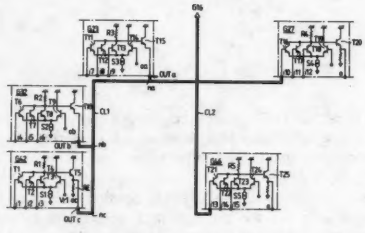
Yasuo Satoh, Ohme, and Tohru Kobayashi, Iruma, both of Japan, assignors to Hitachi, Ltd., Tokyo, Japan

Filed Apr. 28, 1989, Ser. No. 344,669

Claims priority, application Japan, Apr. 30, 1988, 63-107818

Int. Cl.[5] H03K *19/177*

U.S. Cl. 307—465 **4 Claims**



1. A semiconductor integrated circuit device comprising:

a first logic gate cell group;

a first common wiring for connecting an output terminal of each logic gate cell in said first logic gate cell group in order to connect said output terminals with one another, wherein said first common wiring has a first end and a second end, and wherein said output terminals of each of said logic gate cells in said first logic gate cell are coupled to said first common wiring between said first and said second ends;

a terminal resistor disposed inside a logic gate cell connected to the first end of said first common wiring, for setting the output level used commonly for said logic gate cells in said first logic gate cell group;

a second logic gate cell group; and

a second common wiring coupled to said second end of said first common wiring for connecting an input terminal of each of said logic gate cells in said second logic gate cell group to the second end of said first common wiring.

4,987,327

APPARATUS FOR ADJUSTING DC OFFSET VOLTAGE

Virgilio A. Fernandez, Sunrise, Fla., and Gianfranco Gerosa, Austin, Tex., assignors to Motorola, Inc., Schaumburg, Ill.

Filed May 30, 1989, Ser. No. 357,911

Int. Cl.[5] G06G *7/10*; H03K *3/01*

U.S. Cl. 307—491 **11 Claims**

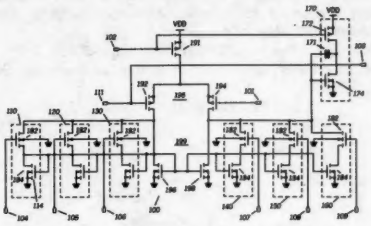
1. In an apparatus having an offset voltage being adjustable by adjusting current through a circuit, comprising:

means for biasing said circuit;

plurality of parallel transistor stages coupled to said circuit, each including:

at least one transistor,

means for increasing the current through said transistor stages when said transistor stages are activated, wherein geometry of said transistor determines the current increase;



means for selectively activating a number of said transistor stages responsive to at least one control signal wherein the selected number of activated stages adjust the current through said circuit.

4,987,328

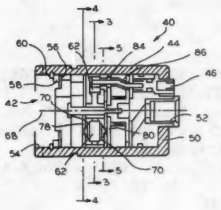
ROTATING RECTIFIER IN BRAZED ASSEMBLY

Mohammad Shahamat, Rockford, Ill., assignor to Sundstrand Corporation, Rockford, Ill.

Filed Feb. 1, 1990, Ser. No. 473,413

Int. Cl.[5] H02K *11/00*

U.S. Cl. 310—68 D **7 Claims**



1. A rectifier assembly comprising:

a plurality of conductive phase plates each having opposite surfaces;

insulated means mounting said conductive phase plates in a plane and angularly spaced about a central axis;

a plurality of diode wafers, two for each said conductive phase plate;

brazing means for rigidly securing each said diode wafer to one of the surfaces of one of the conductive plates, whereby said diode wafers are located in opposite first and second planes;

first and second conductive output plates;

brazing means for rigidly securing said first output plate to the diode wafers in said first plane and said second output plate to the diode wafers in said second plane;

input terminal means for electrically connecting each said phase plate to a respective phase of an ac input source; and

output terminal means for electrically connecting each said output plate to a point of use.

4,987,329

MOTOR MAGNET ARRANGEMENT

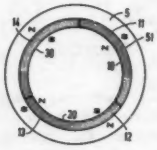
Helmut Schmidt, Reichenberg; Ernst Grecksch, Estenfeld, and Manfred Eisenmann, Wiesentheid, all of Fed. Rep. of Germany, assignors to Siemens Aktiengesellschaft, Berlin & Munich, Fed. Rep. of Germany

Filed Sep. 9, 1988, Ser. No. 242,703

Claims priority, application Fed. Rep. of Germany, Sep. 11, 1987, 3730596

Int. Cl.[5] H02K *21/12, 1/22, 1/27*

U.S. Cl. 310—156 4 Claims



1. A magnet arrangement for a permanent magnet-excited electric motor, the magnet arrangement comprising a radial magnet having a radially magnetized magnet surface, said magnet surface having a circumference, the circumference having a pole sequence which alternates over the circumference of the magnet surface, said magnet arrangement comprising three magnet segments each having a plurality of poles which alternate and follow each other in a circumferential direction of the magnet arrangement, each magnet segment having a portion of at least one pole provided thereon such that at least one pole extends over two adjacent magnet segments with a division between adjacent segments such that the division is not centered on a pole, said three magnet segments having equal lengths, said magnet arrangement having at least four poles wherein a first of said magnet segments is occupied by a complete pole and one-third of a following second pole, that the next magnet segment is occupied by two-thirds of the second pole and two-thirds of a third pole and that the third magnet segment is occupied by one-third of the third pole and a complete fourth pole.

4,987,330

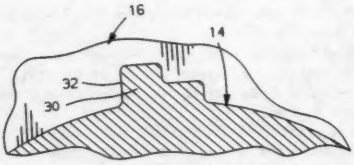
ROTOR LAMINATION ASSEMBLY FOR A DYNAMOELECTRIC MACHINE

John W. Murphy, Kettering; Albert G. Haitz, Dayton, and Kenneth L. Myers, Kettering, all of Ohio, assignors to General Motors Corporation, Detroit, Mich.

Filed Jan. 16, 1990, Ser. No. 465,294

Int. Cl.[5] H02K *1/00*

U.S. Cl. 310—217 2 Claims



1. A dynamoelectric machine rotor in which a plurality of laminations are supported on a peripheral surface of a shaft, the shaft having two or more axially extending keys formed on said peripheral surface, and the laminations having complementary keyways which receive the axially extending keys of said shaft to mechanically couple the laminations to the shaft, the improvement wherein:

N sets of asymmetric keys and keyways are symmetrically distributed about the shaft and laminations, each key and keyway being bi-laterally asymmetric about a central radial axis so as to prevent inadvertent reversal of the laminations during assembly of the rotor while permitting angular displacement of juxtaposed laminations.

4,987,331

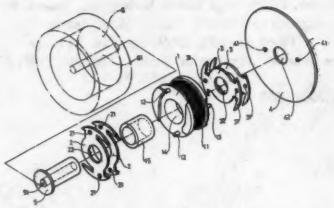
NON-BRUSH D.C. MOTOR WITH AN IMPROVED STATOR

Alex Horng, No. 149, Yi-Yung Rd., Kaohsiung City, Taiwan 800

Filed Mar. 6, 1989, Ser. No. 319,288

Int. Cl.[5] H02K *1/12, 1/00, 3/00, 11/00*

U.S. Cl. 310—254 1 Claim



1. A brushless D.C. motor comprising a rotor, a shaft for the rotor, a circuit board, and a stator which comprises a base of plastic material having an outer round circumference and a pair of opposite circular sides with a pair of feet extending from each side and a central opening housing a metal cylinder, the metal cylinder having a central opening, a cylindrical bearing passing through the central opening of the metal cylinder and having a central shaft opening with the shaft of the rotor disposed for rotation therein and a pair of magnetic polar plates at each of the opposite circular sides of the base, each polar plate of each pair having an inner circular portion and two substantially diametrically oppositely positioned outer portions comprising oppositely directed leg-type extensions spaced from said central portion and each extension having a radially outer edge forming a part of the outer peripheral edge of the polar plate and an inner substantially straight edge spaced from the inner circular portion to form a gap therebetween, polar plate receiving slots in the outer surface of said circular sides extending at right angles relative to each other, at least one of said polar plates of each pair of polar plates being fitted in a respective one of said slots, the pairs of plates being arranged so that their polar axes are at right angles to each other, the circuit board being located on one of the circular sides of the base with one pair of said polar plates located between the one circular side and the circuit board, the stator being held together by the feet extending from both sides of the base and extending through holes in the polar plates and in the circuit board.

4,987,332

ROBOT HAND FOR ELECTROSTATICALLY APPLYING THIN WORKPIECE TO MOLD

Tadashi Yamamoto, Tokyo; Kazumitsu Takai, Misato, and Akira Shimizu, Kasukabe, all of Japan, assignors to Pentel Kabushiki Kaisha, Japan

Filed Sep. 29, 1989, Ser. No. 414,764

Claims priority, application Japan, Sep. 30, 1988, 63-246731; Mar. 31, 1989, 1-082991

Int. Cl.[5] H02N *1/00;* B29C *49/24*

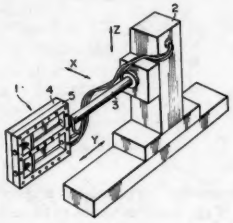
U.S. Cl. 310—309 13 Claims

1. A robot hand apparatus for applying a thin workpiece into a mold that has a static electricity generating apparatus for

generating static electricity on a holding surface, wherein said static electricity generating apparatus comprises:

a base in the shape of a plate and attached to the forward end of an arm of said robot hand apparatus in parallel with a line extending from said arm and having opposed surfaces;

a holding member having substantially the same external dimension as that of said base and being attached to one surface of said base in an overlaid manner, the holding member having a workpiece holding surface having substantially the same shape as that of said thin workpiece on



the side opposite to the surface to which said base is attached;

metal conductors stretched along the holding member by means of securing members in grooves opened on the side of said holding surface in the holding member;

high-voltage cables having static electricity shields connected to the metal conductors and being connected to a high-voltage power source; and

a plurality of suction holes opened perpendicularly to said holding surface of the holding member and connectable to a vacuum generating source.

4,987,333

ELECTRIC MOTOR WITH INNER DRIVE PULLEY

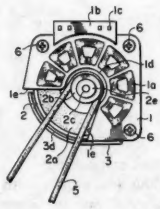
Naoto Noguchi, Hirakata, and Isao Shinohara, Ikoma, both of Japan, assignors to Matsushita Electric Industrial Co., Ltd., Osaka, Japan

Filed Mar. 16, 1990, Ser. No. 494,626

Claims priority, application Japan, Mar. 22, 1989, 1-69728

Int. Cl.[5] H02K *7/10*

U.S. Cl. 310—268 **4 Claims**



1. A brushless motor, comprising a stator coil member in which a cutout is formed so as to extend to a rotor shaft hole section in the center with a plurality of driving coils being arranged in said stator coil member in a part other than said cutout, a rotor member in which a permanent magnet that rotates oppositely facing said driving coils is held, a bracket member for holding said stator coil member and for rotatably holding said rotor member, and a subrotor member which is held in the rotor member in such a configuration that the stator coil member is put between itself and said permanent magnet of the rotor member, said subrotor being provided with a pulley member which rotates integrally with said rotor member and which is positioned on the rotor shaft hole section of said stator coil member so that a belt which is wound on said pulley member is pulled out via said cutout of said stator coil member.

4,987,334

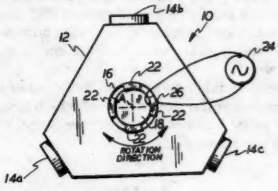
PIEZOELECTRIC DITHER MOTOR

Douglas R. Jungwirth, Reseda, Calif., assignor to Northrop Corporation, Hawthorne, Calif.

Filed Aug. 15, 1989, Ser. No. 394,787

Int. Cl.[5] H01L *41/08*

U.S. Cl. 310—333 **9 Claims**



1. In a laser gyroscope having an opening therethrough and a dither axis passing through the opening about which the gyroscope is oscillated, dither motor apparatus for oscillating the gyroscope about the dither axis comprising in combination:

support means passing through the opening;

a plurality of piezoelectric elements interposed between an outer surface of said support means and an inner surface of the opening, an outer surface of each of said elements being rigidly coupled to the inner surface of the opening and an inner surface of each of the elements being rigidly coupled to the outer surface of the support means; and

means for energizing said plurality of piezoelectric elements for causing each of said elements to shear such that the outer surface of each of the elements rotates alternately clockwise and counter-clockwise with respect to the inner surface of each of the elements, thereby imparting an oscillatory motion to the gyroscope.

4,987,335

SECONDARY ELECTRON MULTIPLIER

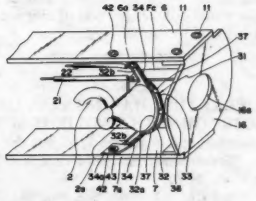
Hiroshi Yamamoto, Kyoto, and Takeshi Terashima, Nagaokakyo, both of Japan, assignors to Murata Manufacturing Co., Ltd., Japan

Filed Aug. 11, 1989, Ser. No. 392,837

Claims priority, application Japan, Aug. 11, 1988, 63-202065

Int. Cl.[5] H01J *43/04*

U.S. Cl. 313—103 R **1 Claim**



1. A secondary electron multiplier comprising a pair of insulating plates arranged in parallel with each other which are fixed by a face plate having an incident aperture for charged particles and a terminal plate member, a secondary electron multiplying tube having a funnel portion at the input end thereof which is made of a semiconductive material having a secondary electron emissive property and a collector for col-

lecting a flow of secondary electrons multiplied by said multiplying tube wherein said secondary electron multiplying tube is supported between said pair of insulating plates in such a manner that the mouth of said funnel is inclined at a predetermined angle to an opening of a Faraday cup fixed at the rear side of said incident aperture of said face plate,

said secondary electron multiplier being characterized by further comprising a support metal member having a circular contact element for supporting an end face of said mouth of said funnel, plural nails formed along the outer periphery of said circular contact element for grasping said mouth of the funnel from outside thereof and a pair of support arms being extended from the outer periphery of said circular contact element toward said respective insulating plates, said support arms having portions bent along said insulating plates so as to fix them to said insulating plates, and

a press metal member to be fitted to the outer periphery of said funnel near the mouth thereof which is welded to said support metal member to support the funnel fixedly to said support metal member.

4,987,336

REVERSIBLE SHORT-CIRCUIT AND THE USE OF SAID SHORT-CIRCUIT IN A PHOTOELECTRIC TUBE

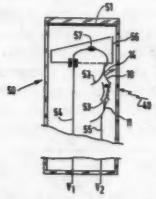
Pierre L'Hermite; Michel Vergne, and Alain Escapoulade, all of Brive, France, assignors to U.S. Philips Corp., New York, N.Y.

Filed Jun. 16, 1987, Ser. No. 62,923

Claims priority, application France, Jul. 23, 1986, 86 10691

Int. Cl.[5] H01J *43/00*

U.S. Cl. 313—105 R **6 Claims**



1. A reversible short circuit device comprising a metal loop having a first base side forming a first contact, a second side and a third side spaced apart from each other and extending away from said first side, said second side including a contact portion for engagement with an external object, said second and third sides being connected by a frangible fourth connection side, one of said second and said third sides being subject to a recoiling force when said fourth side is interrupted to thereby displace said contact portion of said second side out of engagement with said external object.

4,987,337

COLOR DISPLAY TUBE HAVING A COLOR SELECTION ELECTRODE WITH RESILIENT SUPPORT

Hendrik Bongenaar, and Henricus J. M. van der Avoort, both of Eindhoven, Netherlands, assignors to U.S. Philips Corporation, New York, N.Y.

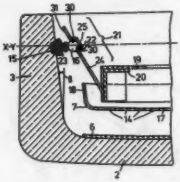
Filed Dec. 12, 1988, Ser. No. 282,670

Claims priority, application Netherlands, Dec. 11, 1987, 8702993

Int. Cl.[5] H01J *29/07*

U.S. Cl. 313—406 **5 Claims**

1. A color display tube comprising: an envelope including a neck having an electrode system for generating three electron beams, and a substantially rectangular display window having a peripheral upright edge; a display screen of phosphor elements luminescing in different colors on the inside of the display window; a substantially rectangular color selection electrode suspended at a short distance from the display screen and having a large number of apertures, the apertures of the color selection electrode directing each electron beam to phosphor elements of one color; the tube having its longitudinal axis perpendicular to an X-Y plane; pin-shaped members having a spherical free end portion arranged in the corners of the upright edge of the display window; resilient suspension elements secured to the color selection electrode, which



suspension elements are substantially perpendicular to the deflection path of the electron beams to be deflected towards the relevant corner, each resilient suspension element comprising a conical portion defining at least one aperture, the sperical free end portion of each pin-shaped member engaging the aperture of the corresponding resilient element, the spherical free end portion and the conical portion having at least three points of contact;

characterized in that the central axis of the pin-shaped member forms an angle with the X-Y plane.

4,987,338

CATHODE RAY TUBE WITH FILM ON FACE-PLATE

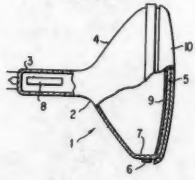
Takeo Itou; Hidemi Matsuda, both of Saitama, and Hajime Tanaka, Gunma, all of Japan, assignors to Kabushiki Kaisha Toshiba, Kawasaki, Japan

Filed Mar. 23, 1989, Ser. No. 327,733

Claims priority, application Japan, Mar. 31, 1988, 63-76255; Jun. 22, 1988, 63-152259

Int. Cl.[5] H01J *29/88*

U.S. Cl. 313—478 **14 Claims**



1. A cathode ray tube comprising:

an envelope including a face-plate with an inner and outer surfaces and a sidewall portion, a neck, and, a cone connecting the faceplate to the neck;

an electron gun provided inside the neck for emitting at least one electron beam;

a phosphor screen provided on the inner surface of the faceplate for emitting a visible light by bombardment of the electron beam; and,

an antistatic layer covering the outer surface of the faceplate, the antistatic layer being formed by using a solution containing an alcoholate of silicon as main constituent and a stabilizing substance present in operative concentrations for maintaining antistatic characteristics of the antistatic layer wherein the stabilizing substance is organic material which is soluble in water or organic solvent and has molecular weight in the range from 100 to 5000.

4,987,339

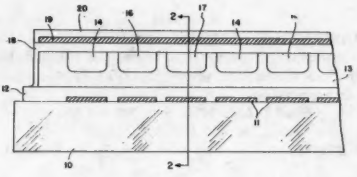
ENHANCED SINGLE LAYER MULTI-COLOR LUMINESCENT DISPLAY WITH COACTIVATORS

James B. Robertson, Yorktown, Va., assignor to The United States of America as represented by the United States National Aeronautics and Space Administration, Washington, D.C.

Continuation-in-part of Ser. No. 140,185, Dec. 31, 1987. This application Apr. 13, 1989, Ser. No. 338,379

Int. Cl.[5] H05B *33/14*

U.S. Cl. 313—502 10 Claims



1. An enhanced, single-layer multi-color luminescent surface comprising:

an insulator substrate;

a single layer of host material having a smooth top surface on said substrate, said single layer of host material including different activators within selected areas therein forming a pattern of one or more phosphor areas of selected and distinct colors within said single layer of host material; and

a coactivator selectively introduced into one or more or said phosphor areas thereby enhancing the brilliance of the color of colors thereof.

4,987,340

LEAD WIRE MOUNTING STRUCTURE FOR ELECTROLUMINESCENCE

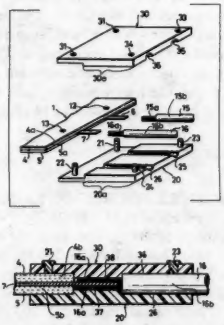
Kenji Yoshioka, Miyagi, Japan, assignor to Alps Electric Co., Ltd., Tokyo, Japan

Filed Aug. 4, 1989, Ser. No. 389,643

Claims priority, application Japan, Oct. 17, 1988, 63-134444[U]

Int. Cl.[5] H05B *33/06*

U.S. Cl. 313—512 2 Claims



1. In a mounting structure of insulated lead wires to an electroluminescence including a laminated element composed of a transparent electrode, a light emitting layer and a counter electrode, a pair of sealing films for sealing said laminated element, and a pair of terminals led out from said transparent electrode and said counter electrode and projecting from marginal edges of said sealing films for electrical connection with said insulated lead wires; the improvement comprising a first retainer plate having a plurality of bosses some of which are to be inserted through said sealing films, and a second retainer plate having a plurality of holes to be engaged with said bosses, wherein said first and second retainer plates are opposed to each other in such a manner as to sandwich marginal end portions of said sealing films, said terminals projecting from said sealing films, and end portions of said insulated lead wires fixedly connected to said terminals, and said bosses of said first retainer plate inserted into said holes of said retainer plate are caulked to firmly hold said marginal end portions of said sealing films and said end portions of said insulated lead wires.

4,987,341

FLASH LAMP WITH METAL COATING ON AN OUTER END OF AN ELECTRODE THEREOF

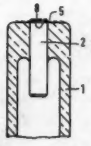
Eugen Achter, Trebur; Ingo Duenisch, and Michael Lausch, both of Taunusstein, all of Fed. Rep. of Germany, assignors to Heimann GmbH, Wiesbaden, Fed. Rep. of Germany

Continuation-in-part of Ser. No. 403,049, Sep. 1, 1989, abandoned, which is a continuation of Ser. No. 146,100, Jan. 20, 1988, abandoned. This application May 7, 1990, Ser. No. 518,245

Claims priority, application Fed. Rep. of Germany, Jan. 23, 1987, 8701119

Int. Cl.[5] H01J *61/30, 61/36*

U.S. Cl. 313—623 7 Claims



1. A flash lamp having a tubular, closed glass housing at whose opposite ends electrodes of refractory metal are fused therein, comprising at least one electrode having an outer end terminating approximately flush with the glass housing and the glass housing having a region surrounding the outer end of the electrode provided with a first soft-solderable metal coating which is conductively connected to the electrode, the outer end of the electrode being covered by a second soft-solderable metal coating.

4,987,342

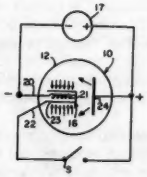
SELF-BALLASTED GLOW DISCHARGE LAMP HAVING INDIRECTLY-HEATED CATHODE

Valery Godyak, Andover, Mass., assignor to GTE Products Corporation, Danvers, Mass.

Filed Mar. 27, 1989, Ser. No. 328,994

Int. Cl.[5] H01J *61/12, 61/56;* H05B *41/18*

U.S. Cl. 315—49 5 Claims



1. A self-ballasted negative glow discharge lamp comprising:

a light-transmitting envelope containing a gas fill material;

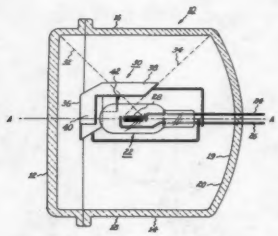
a phosphor coating disposed on the inner surface of said envelope;
an anode located within said envelope;
an indirectly-heated cathode located within said envelope for emitting electrons, said indirectly-heated cathode including a heater filament surrounded by a metallic cylinder coated with an emissive material, said heater filament connected in series with the discharge so that discharge current flows therethrough, said heater filament having a resistance sufficient by itself to ballast said negative glow discharge lamp; and
lead-in wires coupled to said cathode and anode extending through and hermetically sealed in said envelope.

4,987,343

VEHICLE HEADLAMP

Walter J. Kosmatka, Highland Heights; Frank E. Zalar, Euclid, and Dean R. Tener, Bath, all of Ohio, assignors to General Electric Company, Schenectady, N.Y.

Filed Oct. 3, 1988, Ser. No. 252,621
Int. Cl.[5] B60Q *1/04*
U.S. Cl. 315—82 **22 Claims**



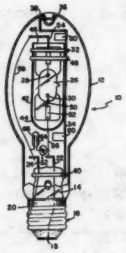
1. A vehicle headlamp which comprises:
(a) a reflector member having an internal cavity terminating at one end in a curved reflecting surface, said reflector having a principal axis, a focal point and a top section,
(b) a lens member affixed to the opposite end of the reflector member,
(c) a hermetically sealed electric lamp having a source of light and disposed within the internal cavity substantially adjacent to the focal point of the curved reflecting surface, said lamp having a length which extends longitudinally along and is in adjacent alignment with said principal axis, and
(d) a unitary glare and heat shield member positioned within the internal cavity adjacent to the electric lamp, said unitary member comprising;
(d_1) a first surface portion located between the lamp and lens member, said first surface portion being located in front of the entire lamp and having a length that extends below said lamp so as to intercept forward direct related light emitted from the light source from reaching the lens member;
(d_{11}) a second surface portion located above said lamp and extending from said first surface portion by a length far enough so as to cover the source of light of said lamp, said second surface portion primarily averting shadowing by the unitary member in the projected beam pattern and intercepting substantially all forward direct related light from reaching said top section of the reflector member;
(d_{111}) first and second tab portions merged with said first and second surface portions, said tab portions extending from said second surface portion by a length far enough so as to extend below the principal headlamp axis, said tab portions intercepting a portion of the forward direct light which lies above the principal axis,
said unitary member functioning during operation of said headlamp so as to (1) cause the first surface portion to intercept forward direct related light from reaching the lens, (2) cause the second surface portion to intercept forward direct related light from reaching the top section that would otherwise result in uncontrolled glare light, (3) cause the first and second tab portions to intercept a portion of the forward direct related light above the principal axis that would otherwise result in uncontrolled glare light, (4) cause the unitary member to avert shadowing of itself in the projected beam pattern, and (5) reduce convection heating of the reflector member.

4,987,344

ARC DISCHARGE LAMP WITH INTERNAL STARTER

Gregory Zaslavsky, Chestnut Hill, Mass., and Nikolaos Barakitis, San Jose, Costa Rica, assignors to GTE Products Corporation, Danvers, Mass.

Filed Feb. 5, 1990, Ser. No. 474,962
Int. Cl.[5] H05B *41/14*
U.S. Cl. 315—59 **5 Claims**



1. A high intensity discharge lamp comprising:
an arc tube having first and second electrodes respectively sealed at opposite ends thereof;
an outer envelope surrounding said arc tube,
a lamp base having first and second terminals disposed at one end of said outer envelope;
means for electrically coupling said first terminal of said lamp base to said first electrode of said arc tube;
means for electrically coupling said second terminal of said lamp base to said second electrode of said arc tube; and
a starting circuit disposed within said lamp electrically connected in parallel with said arc tube, said starting circuit comprising a non-linear dielectric element and a UV capsule, said UV capsule located within said outer envelope proximate said arc tube and adapted to produce ultraviolet radiation.

4,987,345

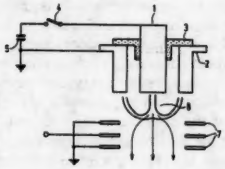
CHARGED PARTICLE SOURCE OF LARGE CURRENT WITH HIGH ENERGY

Hans-Peter Stormberg, Stolberg, Fed. Rep. of Germany; Yoshio Watanabe, and Isao Ochiai, both of Tokyo, Japan, assignors to U.S. Philips Corporation, New York, N.Y.

Filed Jul. 8, 1988, Ser. No. 216,938
Claims priority, application Japan, Jul. 10, 1987, 62-170957
Int. Cl.[5] H05H *1/24*
U.S. Cl. 315—111.21 **2 Claims**

1. A charged particle source for providing high energy particles at high currents comprising
(a) first and second electrodes disposed in a coaxially symmetric relation and disposed in an axial asymmetric relation, said first electrode having a rod-like shape, and said second electrode having one of a cylindrical or annular shape coaxial with said first electrode,

(b) a filling gas sealingly disposed in a space between said first and second electrodes, said filling gas providing a plasma in said space from a tip of said first electrode, said filling gas consisting of an element having an atomic number greater than 5, and said filing gas being under a pressure of at most 0.7 torr,



(c) source means for providing a discharge current of at least 100KA in a period of at most 1μsec, said source means being connected between said first and second electrodes, and

(d) focussing means for focussing charged particles emitted from said plasma in a radial direction into an axial direction, said focussing means being disposed after said first and second electrodes in said axial direction.

4,987,346

PARTICLE SOURCE FOR A REACTIVE ION BEAM ETCHING OR PLASMA DEPOSITION INSTALLATION

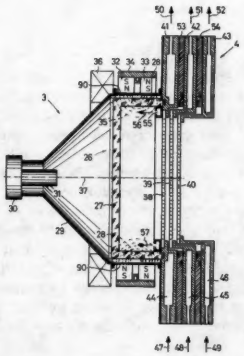
Werner Katzschner, Kleinkahl-Grosslaudenbach; Stefan Eichholz, Kiel; Michael Geisler, Wachtersbach, and Michael Jung, Kahl, all of Fed. Rep. of Germany, assignors to Leybold AG, Fed. Rep. of Germany

Filed Jan. 18, 1989, Ser. No. 298,488

Claims priority, application Fed. Rep. of Germany, Feb. 5, 1988, 3803355

Int. Cl.[5] H01J *27/16;* H05H *1/46*

U.S. Cl. 315—111.41 **20 Claims**



1. Particle source, in particular for a reactive ion beam etching or plasma deposition installation, with

(a) a container (26) of a non-ferromagnetic and non-conducting material for a gas or gas mixture or plasma which has an upper face (27) and a side wall (28) and which has opposite the upper face (27) an aperture from which particles can emerge from the container;

(b) a feed (55) for a gas or a gas mixture into the container;

(c) an arrangement (29) for the feeding of electromagnetic waves, preferably microwaves, which adjoins the upper face (27) of the container;

(d) at least one magnetic field generator which is configured outside of the container and which contains at least one north pole and one south pole, with the north and south pole being directed toward the container in such a manner that a curved magnetic field between north and south pole forms which projects into the interior of the container,

characterized in that

(e) the arrangement for the feeding of electromagnetic waves is a flared radiator (29) whose widest flare opening corresponds essentially to the area of the upper face (27) of the container;

(f) the side wall (28) of the container (26) is surrounded by an electrically conducting but not ferromagnetic hollow body (90);

(g) the magnetic field generator (32, 33) is configured on the outside of the hollow body (90) and extends essentially from the aperture of the container (26) to the widest flare opening of the flared radiator (29).

4,987,347

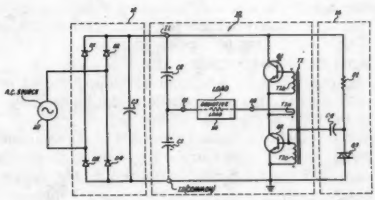
LAMP DRIVER CIRCUIT

Robert A. Leskovec, Highland Heights; John M. Davenport, Lyndhurst, and Joseph M. Allison, Euclid, all of Ohio, assignors to General Electric Company, Schenectady, N.Y.

Filed Mar. 8, 1989, Ser. No. 320,726

Int. Cl.[5] H05B *39/00, 41/14*

U.S. Cl. 315—209 R **16 Claims**



1. A lamp driver circuit for driving a lamp circuit with an AC squarewave voltage at a relatively high frequency, comprising:

a self-oscillating half-bridge circuit having a pair of input terminals for connection across a DC voltage supply and a pair of output terminals for connection across a said lamp circuit including a lamp to be energized;

said bridge circuit including a pair of capacitors connected together in series across said input terminals and having a junction therebetween connected to a first one of said output terminals; and

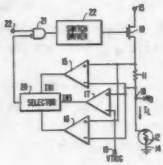
said bridge circuit further including first and second transistor switching means connected together in series across said input terminals, a transformer having a single saturable core having first and second windings thereon respectively connected to said first and second switching means for alternately applying forward biasing base drive current to said first and second transistor switching means, thereby producing in said transistor switching means alternate conductive intervals, and a third winding on said core connected in series with the junction of said first and second transistor switching means and a second one of said output terminals for energization by current in a circuit between said junctions for supplying a squarewave voltage across said output terminals for driving said lamp circuit, and in which: said forward biasing base drive current in each transistor switching means during each conductive interval thereof is terminated by saturation of said core in response to passage of a predetermined pulse of current through said third winding.

4,987,348

BILEVEL CURRENT LIMITER

Stephen L. Wong, Scarsdale, N.Y., assignor to North American Philips Corporation, New York, N.Y.

Filed Dec. 15, 1989, Ser. No. 452,092
Int. Cl.[5] H05B *39/04*
U.S. Cl. 315—307 7 Claims



1. A control circuit for energizing an electric load comprising:

input terminals for supplying a source of electric current to the load,

a controlled semiconductor power device having a characteristic that defines a safe operation area (SOA) of the semiconductor power device,

current sensing means,

means for coupling at least a part of said semiconductor power device, said current sensing means and said load in series circuit across said input terminals,

means coupled to said current sensing means for setting first and second current limits for the control circuit, each of which is set near to the boundary of the SOA of said semiconductor power device,

means controlled by a voltage developed at said load for selecting said first and second current limits as a function of the level of the load voltage, and

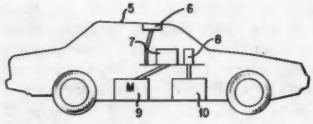
means coupled to a control electrode of the semiconductor power device and controlled by said setting means for controlling and limiting the current passed by said semiconductor power device to the load as a function of the current limit selected in response to the load voltage.

4,987,349

INFRARED REMOTE CONTROL TOY

Yoshio Nakamura, Tokyo, Japan, assignor to Hokuko Sangyou Limited Responsibility Company and Alps Shoji Company Limited, both of Tokyo, Japan

Filed Jul. 19, 1989, Ser. No. 382,204
Claims priority, application Japan, Jul. 20, 1988, 63-96901[U]
Int. Cl.[5] H02P *1/22*
U.S. Cl. 318—293 2 Claims



1. An infrared remote control toy comprising:

a toy body having an electric motor mounted in said toy body for moving the same, a light receiving element mounted on the toy body for receiving infrared light to provide an electrical on/off signal, and a power source,

an integrated logic circuit mounted in the toy body for receiving the electrical on/off signal from the light receiving element, said integrated logic circuit having a first terminal for providing a forward driving signal, a second terminal for providing a rearward driving signal, and a transistor connected across the power source and having a collector connected to the first terminal and a base connected to the second terminal, said base receiving a signal corresponding to the electrical on/off signal from the light receiving element, and

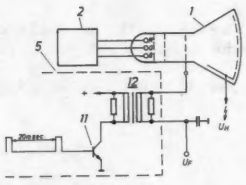
a motor driving circuit mounted in the toy body and including a pair of a series connection of first and third transistors and a series connection of second and fourth transistors connected across the power source, said electric motor being connected across a first junction between the first and third transistors and a second junction between the second and fourth transistors such that bases of the third and fourth transistors are connected to the second and first junctions, respectively, and bases of the first and second transistors being connected to the first and second terminals of the integrated logic circuit, respectively so that the motor driving circuit operates at low electricity supplied from the logic circuit in both forward and rearward drivings.

4,987,350

PICTURE REPRODUCTION APPARATUS WITH A CATHODE RAY TUBE AND AN ARRANGEMENT FOR MEASURING THE BEAM CURRENT

Uwe Hartmann, Untergriesbach, and Fritz Ohnemus, Villingen-Schwenningen, both of Fed. Rep. of Germany, assignors to Deutsche Thomson-Brandt GmbH, Villingen, Fed. Rep. of Germany

Filed Sep. 1, 1989, Ser. No. 402,075
Claims priority, application Fed. Rep. of Germany, Sep. 3, 1988, 3830074
Int. Cl.[5] G09G *1/04;* H01J *29/58*
U.S. Cl. 315—382 7 Claims



1. A video-display unit comprising: a cathode-ray tube with electron beam means; means for measuring beam current of said cathode-ray tube for a predetermined time interval during predetermined lines exterior to an image being displayed for establishing automatic cutoff for said electron beam means; and means for defocusing an electron beam from said electron beam means during said predetermined time interval, said defocusing being independent of contents of said image so that initial ones of said lines are substantially invisible, said lines being generated inside said video-display unit and being located outside said image being displayed, said lines being free of contents of said image and thereby independent of the contents, said lines to be made invisible by said defocusing and being introduced into said cathode-ray tube for measuring said beam current.

4,987,351

LOAD-BASED CONTROL OF AN AC MOTOR

Robert J. Disser, Dayton; Jeff A. Foust, Eaton; Richard N. Lehnhoff, Kettering; Donald E. Graham, Dayton, and Bruce A. Heaston, Union, all of Ohio, assignors to General Motors Corporation, Detroit, Mich.

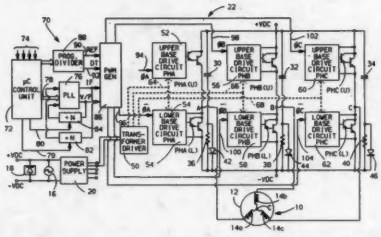
Filed Jan. 11, 1990, Ser. No. 464,056
Int. Cl.[5] H02P *5/46*
U.S. Cl. 318—78 3 Claims

1. In an AC motor control wherein the electrical voltage and frequency supplied to the motor by a motor energization circuit are varied in relation to an estimate of average motor load, the improvement wherein the estimate of average motor load

is developed according to a method comprising the steps of repeatedly:

measuring the electrical power input of the motor energization circuit;

computing a motor power loss term in relation to an estimate of the average motor load; and



computing the instantaneous motor load in relation to the difference between the measured power input and the computed motor power loss term; and

adjusting the estimate of the average motor load in relation to difference between it and the computed instantaneous motor load.

4,987,352

BRUSHLESS MOTOR DRIVER

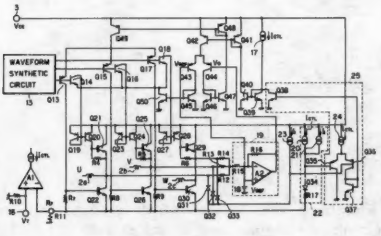
Toshihiko Ishii, Itami, Japan, assignor to Mitsubishi Denki Kabushiki Kaisha, Tokyo, Japan

Filed Mar. 14, 1989, Ser. No. 323,393

Claims priority, application Japan, Jun. 20, 1988, 63-153089

Int. Cl.[5] H02K *29/00*

U.S. Cl. 318—254 **5 Claims**



1. A brushless motor driver comprising:

a brushless motor having a rotor and driving coils for polyphase operation;

a plurality of drive transistors;

control signal producing means for producing control signals for one of said plurality of drive transistors for each phase of said polyphase operation on the basis of the rotating angle of said rotor;

means for applying a torque command;

current adjusting means for adjusting the value of said transistor drive control signals on the basis of said torque command;

wherein each of said plurality of drive transistors has a collector electrode, an emitter electrode and a control electrode for driving said rotor by controlling an input to said driving coils on the basis of said transistor drive control signals applied to each of said control electrodes;

saturation voltage creating means for creating a saturation voltage corresponding to said torque command; and

current correcting means for comparing said saturation voltage created by said saturation voltage creating means with an operating voltage between the collector and emitter electrodes of each of said plurality of driving transistors to change said transistor drive control signals so that said operating voltage drops below said saturation voltage created by said saturation voltage creating means.

4,987,353

CURRENT SWITCHING DEVICE FOR MOTOR

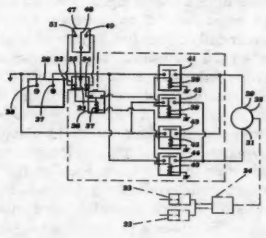
Hirofumi Imaeda, Hamamatsu, Japan, assignor to Sanshin Kogyo Kabushiki Kaisha, Hamamatsu, Japan

Filed Apr. 26, 1989, Ser. No. 343,905

Claims priority, application Japan, Apr. 27, 1988, 63-105250

Int. Cl.[5] H02P *1/22*

U.S. Cl. 318—293 **7 Claims**



1. A marine outboard drive adapted to be mounted on the transom of a watercraft for tilt and trim movement relative thereto, fluid motor means to be interposed between said transom and said outboard drive for controlling the trim and tilt condition thereof, a reversible fluid pump, fluid circuits means interconnects said reversible fluid pump with said fluid motor means for operating said fluid motor means for controlling the tilt and trim condition of said marine outboard drive, a reversible electric motor for driving said reversible fluid pump in selected forward and reverse directions, and a switch arrangement for operating said reversible electric motor in either direction from a source of direct current, said switch arrangement comprising a master switch movable between a neutral position, a forward position, and a reverse position, first and second relays each having respective windings connected in parallel circuit with a first terminal of said master switch for energization when said master switch is switched to its forward position, the contacts of said first and said second relays being connected in circuit with said source and said motor for effecting energization of said motor in a forward direction when said first and said second relay windings are energized, third and fourth relays each having respective windings connected in parallel circuit with a second terminal of said master switch for energization when said master switch is switched to its reverse position, the contacts of said third and fourth relays being connected in circuit with said source and said motor for effecting energization of said motor in a reverse direction when said third and said fourth relay windings are energized.

4,987,354

DEVICE FOR RAIN-INDUCED SWITCHING ON AND OFF OF AN ELECTRIC WINDSCREEN WIPER MOTOR

Helmut Steinmann, Baden-Baden, Fed. Rep. of Germany, assignor to Roberts Bosch GmbH, Stuttgart, Fed. Rep. of Germany

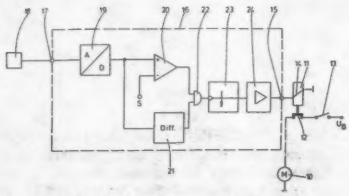
PCT No. PCT/DE88/00374, § 371 Date Jan. 3, 1990, § 102(e) Date Jan. 3, 1990, PCT Pub. No. WO89/00119, PCT Pub. Date Jan. 12, 1989

PCT Filed Jun. 23, 1988, Ser. No. 457,761

Claims priority, application Fed. Rep. of Germany, Jul. 8, 1987, 3722510

Int. Cl.[5] B60S *1/08*

U.S. Cl. 318—444 3 Claims



1. A device for rain-induced switching on and off of an electric windshield wiper motor in vehicles, comprising a rain sensor for generating a sensor signal with an amplitude level dependent on an amount of moisture on a windshield of a vehicle; an electrically controlled switch arranged in a power supply circuit of the windshield wiper motor; and a control unit for controlling the switch, said control unit comprising a comparator for receiving the sensor signal and for generating a first control signal when the amplitude level of the sensor signal exceeds a predetermined threshold value, a differentiator for receiving the sensor signal and for generating a second control signal when the amplitude level of the sensor signal increases within a predetermined time interval, and a logic gate for generating at its output, when both control signals occur simultaneously at its inputs, a switch-on signal applied to said switch.

4,987,355

SELF-SYNCHRONIZING SERVO CONTROL SYSTEM AND SERVO DATA CODE FOR HIGH DENSITY DISK DRIVES

Mark W. E. Leaper; Robert Y. Noguchi, both of Colorado Springs, and Randall L. Sandusky, Woodland Park, all of Colo., assignors to Digital Equipment Corporation, Maynard, Mass.

Filed Dec. 5, 1989, Ser. No. 446,051

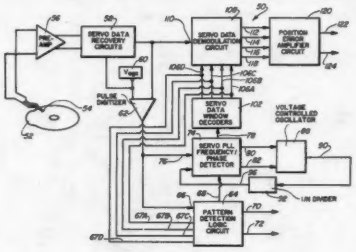
Int. Cl.[5] G05B *13/00*

U.S. Cl. 318—561 12 Claims

1. A servo data disk having a plurality of concentric tracks radially spaced from the center and a servo data code recorded on at least some of said tracks, said servo data disk and code comprising:

at least one sync/index zone having a plurality of tracks divided into a plurality of frames, said servo data code comprising at least one di-bit and a burst of a consecutive plurality of single di-bits, said at least one di-bit being written on each of said tracks within each of said frames of said sync/index zone and said burst being written on each of said tracks in at least one of said frames of said sync/index zone; and

at least one data zone having a plurality of tracks divided into a plurality of frames, said servo data code further comprising a plurality of single di-bits, one of said single di-bits being written on each of said tracks within each of said frames and each of said single di-bits being arranged in an optimum interference pattern with respect to each of the other of said single di-bits, whereby each of said single



di-bits encounters the same amount of intersymbol interference as the other of said single di-bits.

4,987,356

PROFILING CONTROL SYSTEM FOR GIVEN CURVED SURFACE

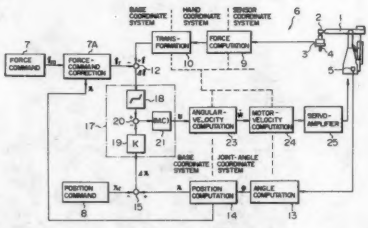
Kazuyoshi Yamada, Ibaraki; Kunio Kashiwagi, Tsuchiura, and Tooru Kurenuma, Ibaraki, all of Japan, assignors to Hitachi Construction Machinery Co., Ltd., Tokyo, Japan

Filed Oct. 13, 1989, Ser. No. 421,371

Claims priority, application Japan, Oct. 14, 1988, 63-258598; Oct. 24, 1988, 63-267952

Int. Cl.[5] G05B *19/18*

U.S. Cl. 318—578 10 Claims



1. A profiling control system which uses a multiple-degree-of-freedom working machine having at least two degrees of freedom, said profiling control system comprising: at least one force control loop including means for detecting force applied to a working tool from a work surface, means for taking an error between the detected force and a force command f_{ro} of a preset urging force of the working tool, means for computing a velocity command u_z of the working tool on the basis of said error, and means for moving the multiple-degree-of-freedom working machine on the basis of said velocity command u_z; means for commanding at least one velocity command u_x of the working tool; and means for moving the multiple-degree-of-freedom working machine on the basis of said velocity command u_x, wherein said profiling control system comprises:

first control means for providing a moving velocity v_{20f} in an urging direction of the working tool, which occurs due to a gradient tan α of the work surface with respect to a feed direction when the working tool is fed with said velocity command u_x and while the working tool is urged against the work surface with said force command f_{ro}; and

second control means for using said moving velocity v_{20f} in the urging direction to correct a controlled variable including one of either said force command f_{ro} or said veloc-

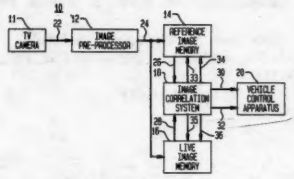
ity command u_z of said force control loop, thereby canceling a force f_{of} due to said moving velocity v_{zof}.

4,987,357

ADAPTIVE MOTOR VEHICLE CRUISE CONTROL

Ichiro Masaki, Rochester, Mich., assignor to General Motors Corporation, Detroit, Mich.

Filed Dec. 18, 1989, Ser. No. 451,838
Int. Cl.[5] G08G *1/123*
U.S. Cl. 318—587 **22 Claims**



7. A control mechanism for determining the distance of a following vehicle from a followed vehicle comprising:

means for storing a reference image of the followed vehicle in memory;

means for storing periodic repetitive live images of the followed vehicle in memory;

means for shifting the scale of each of said stored reference images in discrete steps over a predetermined range to obtain a plurality of scaled images; and

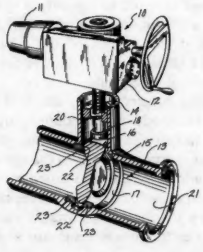
correlation means for selecting, for each of said live images, the one of said scaled images which best matches said stored reference image.

4,987,358

ELECTRONIC TORQUE SWITCH

Timothy R. Branam, 837 N. 11th St., Manitowoc, Wis. 54220

Filed Apr. 21, 1989, Ser. No. 341,368
Int. Cl.[5] H02K *27/30*
U.S. Cl. 318—603 **16 Claims**



1. In a motor operated valve assembly including a valve body, valve closure means within the body movable between a valve open position and a valve closed position, a valve stem attached to the valve closure means, an electric motor, and transmission means operatively connecting the motor and the valve stem for transmitting an operating torque from the motor to the stem for moving the valve closure means, an electronic torque switch for deactivating the motor at a desired level of operating torque on the valve stem comprising:

circuit means for generating a signal representative of motor operating power;

means for generating a signal representative of motor operating power;

means for generating a reference power signal representative of the desired level of operating torque;

comparator circuit means for receiving said power signal and said reference signal and for generating an output control signal when said power signal exceeds said reference signal;

switch means operable in response to said control signal to deactive the motor; and,

wherein the motor is an a.c. motor and the circuit means for generating the power signal comprises:

a multiplier circuit for generating a signal representative of a.c. power from the product of motor voltage and current signals; and,

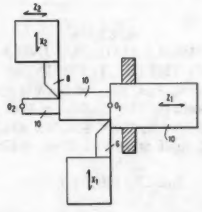
filter means for substantially filtering a.c. frequency components from the a.c. power signal.

4,987,359

NUMERICAL CONTROL DEVICE

Kimio Saitoh, Aichi, Japan, assignor to Mitsubishi Denki Kabushiki Kaisha, Tokyo, Japan

Filed Jan. 27, 1989, Ser. No. 302,294
Claims priority, application Japan, Jan. 29, 1988, 63-19044
Int. Cl.[5] G05B *11/32*
U.S. Cl. 318—625 **3 Claims**



1. A numerical control device for a multi-axis lathe using a plurality of independently movable machining tools, in which a workpiece to be machined is rotated with respect to a Z-axis and is also moved along the Z-axis of a first machining tool comprising:

means for inputting control data for each of said tools, said control data including movement control data in an X-axis direction and a Z-axis direction; and

means for adding the Z-axis movement control data for said first machining tool to each of the Z-axis movement control data for the remaining machining tools so that the Z-axis movements of the remaining machining tools are controlled according to outputs of said adding means, respectively, to thereby control the remaining machine tools to move along the Z-axis direction in synchronization with the movement of the workpiece along the Z-axis.

4,987,360

SELF-CONTAINED RECHARGEABLE BATTERY POWER SOURCE WITH VOLTAGE REDUCER

William J. Thompson, Kittery, Me., assignor to Bill's Ice Cream, Inc., Kittery, Me.

Filed Dec. 27, 1988, Ser. No. 290,759
Int. Cl.[5] H02J *7/00*
U.S. Cl. 320—6 **1 Claim**

1. A self-contained portable, rechargeable, battery unit power source for powering consumer products, comprising:

a high-capacity, rechargeable battery unit,

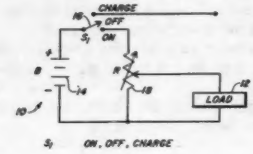
a voltage selection system for selecting one of a plurality of voltages from said battery,

a load circuitry,

means for connecting said load circuitry to said selection system,

said voltage selection system having means for connecting the battery to a charge circuitry, including

a multi-position switch for providing a plurality of "pick off" voltages from the rechargeable battery for use by the load, and



a switch in series with the multi-position switch for connecting, in a first operating mode, the selected voltage to the load, for connecting, in a second operating mode, the rechargeable battery to a charging circuitry, and for disconnecting, in a third operating mode, the battery from both the charging circuitry and the load to prevent unnecessary loss of battery capacity.

4,987,361

SWITCHING REGULATOR HAVING A CONSTANT CURRENT THROUGH ITS INDUCTANCE

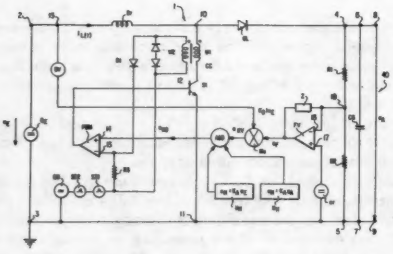
Franz Ohms, Oberrot, Fed. Rep. of Germany, assignor to ANT Nachrichtentechnik GmbH, Backnang, Fed. Rep. of Germany

Filed Nov. 9, 1989, Ser. No. 434,027

Claims priority, application Fed. Rep. of Germany, Nov. 12, 1988, 3838408

Int. Cl.[5] H02M *3/156*

U.S. Cl. 323—222 **7 Claims**



1. In a switching regulator including: a direct voltage source for producing an input voltage; output means; controllable electronic switching means connected between the voltage source and the output means for switching the input voltage to the output means; an inductance connected between the voltage source and the controllable electronic switch means; a pulse width modulator connected for controlling the electronic switch means; a first sawtooth signal means connected to the pulse width modulator for feeding the pulse width modulator a sawtooth signal of approximately constant amplitude; and means for producing a current proportional voltage which is proportional to current through the inductance and feeding the current proportional voltage to the pulse width modulator, the improvement comprising:

a second sawtooth signal means connected to the pulse width modulator for feeding the pulse width modulator a sawtooth signal of amplitude which is proportional to the negative value of the input voltage; and

further signal means connected to said pulse width modulator for feeding said pulse width modulator a further signal having an amplitude which is an inversely proportional function of the magnitude of the input voltage of said input voltage source for maintaining the arithmetic mean of the current through the inductance constant.

4,987,362

SELF-REGULATING DRIVE CIRCUIT FOR THE BASE CURRENT OF A POWER TRANSISTOR WITH SATURATION LEVEL CONTROL

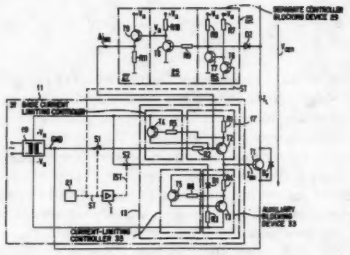
Peter Zwanziger, Nuremberg, Fed. Rep. of Germany, assignor to Siemens Aktiengesellschaft, Berlin & Munich, Fed. Rep. of Germany

Filed Nov. 30, 1989, Ser. No. 444,037

Claims priority, application European Pat. Off., Dec. 13, 1988, 88120832.6

Int. Cl.[5] G05F *1/56*

U.S. Cl. 323—289 **8 Claims**



1. An arrangement for controlling base current of a power transistor having an output comprising:

an adjustable driver stage having an output that is coupled to the base of the power transistor and which provides drive power to the power transistor at the driver stage output, and an adjusting input that receives an auxiliary manipulated variable that adjusts the amount of drive power provided;

a coupling diode coupled to the output of the power transistor, which said coupling diode taps off at a first electrode the voltage at the output of the power transistor and provides said voltage as a system variable signal at a second electrode of said diode;

a saturation level control having an input that is coupled to said second electrode of said coupling diode and an output coupled to the driver stage adjusting input, which said saturation level control receives the system variable signal at its input and provides said auxiliary manipulated variable at its output, whereby said driver stage is adjusted by said auxiliary manipulated variable such that said drive power operates the power transistor at a specified level of saturation.

4,987,363

ELECTRIC ENERGY METER WITH POWER OUTAGE RECOVERY CIRCUIT

Danny R. Gibbs, Lafayette; Patrick A. Burgess, West Point; William J. Kurklis, and Mark A. Harger, both of Lafayette, all of Ind., assignors to Landis & GYR Metering, Inc., Lafayette, Ind.

Filed Sep. 25, 1989, Ser. No. 411,854

Int. Cl.[5] G01R *21/00, 22/00*

U.S. Cl. 324—142 **15 Claims**

1. A method for recovering realtime lost during an outage of an AC energy quantity being measured by an electric energy meter, the meter having a primary DC power supply energized

by the AC energy quantity and a microprocessor, energized by the primary DC power supply, for generating AC energy quantity usage information based upon a number of time-related event clock calendar times and for maintaining realtime by a realtime clock driven by the frequency of the AC energy quantity being measured, comprising the steps of:

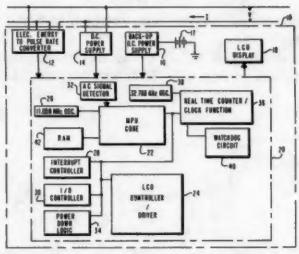
storing in non-volatile memory the time at which the outage occured as registered by the realtime clock;

disabling the microprocessor;

starting a ripple counter energized by a secondary DC power supply and driven by a secondary frequency source;

upon resumption of the AC energy quantity;

enabling the microprocessor;



storing the value of the ripple counter in memory;

restoring the stored time at which the outage occurred into the microprocessor realtime clock; and thereafter,

iteratively incrementing the realtime clock by progressively larger units of time while decrementing the stored value of the ripple counter by amounts corresponding to equal units of time until the stored value of the ripple counter has been decremented to zero;

comparing the incremented time registered by the realtime clock during the iterative step with the number of time-related event clock calendar times for generating AC energy quantity usage information; and

restarting the realtime clock.

4,987,364

ELECTRICAL TESTING PROBE

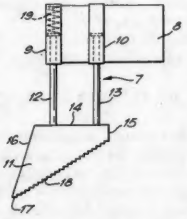
Vivian C. Watts, Towbridge, United Kingdom, assignor to Bath Scientific Limited, Melksham, United Kingdom

Filed Dec. 12, 1989, Ser. No. 449,197

Claims priority, application United Kingdom, Dec. 15, 1988, 8829273

Int. Cl.[5] G01R *31/02, 31/22*

U.S. Cl. 324—158 P **9 Claims**



6. An electrical testing probe, for use in testing a printed circuit board comprising:

a probe body which is generally laminar and which tapers downwardly to provide a contact portion; said contact portion being operable to make electrical contact with specific points on the printed circuit board and

carrying means for carrying said probe body, said carrying means comprising a carrying member and resilient mounting means for mounting said probe body on said carrying member, said resilient mounting means comprising a first sleeve carried by said carrying member and a first elongate member extending from said probe body into said sleeve, said first elongate member being held in a spring-loaded manner in said first sleeve, and a second sleeve and second elongate member extending from said probe body, said second elongate member extending into and being slidable into said second sleeve and serving to prevent rotation of said probe body with respect to said carrying member.

4,987,365

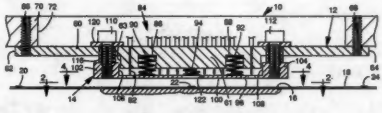
METHOD AND APPARATUS FOR TESTING INTEGRATED CIRCUITS

Robert W. Shreeve, and B. Dale Atwood, both of Corvallis, Oreg., assignors to Hewlett-Packard Company, Palo Alto, Calif.

Filed Apr. 28, 1989, Ser. No. 344,885

Int. Cl.[5] G01R *31/02*

U.S. Cl. 324—158 F **21 Claims**



1. A method of testing integrated circuits of the type which are sequentially mounted on a flexible strip and which include a die in electrical communication with a plurality of test pads formed on the strip, said method comprising the steps of:

positioning a selected strip segment having an integrated circuit die mounted thereon against a substantially flat strip support member;

advancing the strip laterally relative to said strip support member until a selected integrated circuit is in position for testing;

compressing a portion of the strip against the strip support member with a planar plate having an opening therein;

permitting plate angulation relative to said strip support member;

continuing such strip compression until lateral movement of said strip stops;

inserting test probes into the plate opening after stopping strip movement responsive to plate compression;

urging test probes so inserted against each of selected test pads;

testing the integrated circuit; and

lifting the test probes from the pads.

4,987,366

OSCILLATOR DAMPED TEST AND EVALUATION CIRCUIT FOR A PROXIMITY SWITCH

Manfred Hamel, Rhauderfehn, Fed. Rep. of Germany, assignor to Siemens Aktiengesellschaft, Fed. Rep. of Germany

Filed Sep. 23, 1988, Ser. No. 248,635

Claims priority, application Fed. Rep. of Germany, Sep. 24, 1987, 3732211

Int. Cl.[5] G01B *7/14;* **G01N** *27/00;* **H01H** *35/00, 63/00*

U.S. Cl. 324—207.26 **5 Claims**

1. A proximity switch comprising:

(a) a test circuit having:

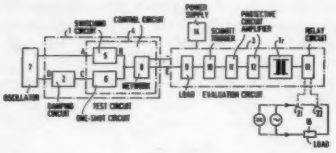
(i) a control circuit for generating pulses at an output thereof;

(ii) an oscillator having an output coupled as an input to

said control circuit said oscillator adapted to be damped by an external element being brought into proximity therewith;

(iii) a damping circuit for said oscillator having an input coupled to the output of said control circuit, and an output coupled to said oscillator; and

(iv) said test circuit with the damping and the control circuit generating a pulse sequence required for active



testing only when said proximity switch is not damped by an external element;

(b) an evaluation circuit receiving an input from said test circuit said evaluation circuit carrying a response current only as long as the test circuit is actively testing in a faultless condition; and

(c) a relay circuit coupled to the output of said evaluation circuit.

4,987,367

METHOD AND APPARATUS FOR PREDICTING DETERIORATION OF A MEMBER CONSTITUTING A PART OF EQUIPMENT

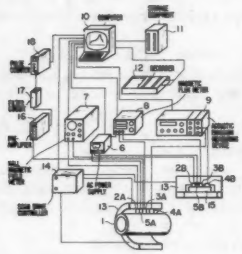
Yuichi Ishikawa, Mito; Toshihiko Yoshimura, Ibaraki; Tasuku Shimizu, Hitachi; Masahiro Otaka, Hitachi, and Kazuo Takaku, Hitachi, all of Japan, assignors to Hitachi, Ltd, Tokyo, Japan

Filed Sep. 12, 1989, Ser. No. 406,366

Claims priority, application Japan, Sep. 16, 1988, 63-230010; Jan. 25, 1989, 01-13947

Int. Cl.[5] G01R *33/12;* **G01N** *27/72, 23/225;* **G21C** *17/00*

U.S. Cl. 324—227 **18 Claims**



7. An apparatus for predicting the degree of deterioration of a metal member in a machine or apparatus, said metal member having a ferromagnetic phase, comprising:

sensor means for measuring a magnetic property of said member, and converting the measured property into electrical signals;

memory means for storing data indicating said magnetic property of said member to be measured and the degree of deterioration of said member;

means connected to said sensor means for measuring said magnetic property in a plurality of regions of said member and for determining an extreme value of said measurements performed at a plurality of locations in each of said regions;

means for estimating the extreme value of said magnetic property of said member as a whole on the basis of the extreme values in said regions, respectively, by applying a return period defined according to extreme value statistical theory;

means for predicting the degree of deterioration of said member on the basis of the extreme value of said magnetic property of said member as a whole; and

means for recognizing the extreme value or the degree of deterioration of said member, and displaying it graphically.

4,987,368

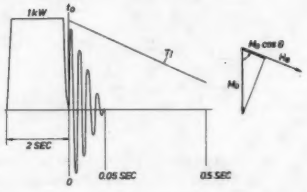
NUCLEAR MAGNETISM LOGGING TOOL USING HIGH-TEMPERATURE SUPERCONDUCTING SQUID DETECTORS

Harold J. Vinegar, Houston, Tex., assignor to Shell Oil Company, Houston, Tex.

Continuation of Ser. No. 117,780, Nov. 5, 1987, abandoned. This application Aug. 31, 1989, Ser. No. 403,042

Int. Cl.[5] G01V *3/00*

U.S. Cl. 324—303 **15 Claims**



1. A nuclear magnetism logging tool, comprising:

means for providing a magnetic field that is capable of being energized or de-energized in response to preselected control signals,

detector means for essentially simultaneously detecting both sinusoidal and slowly varying near D.C. changes in magnetic field when said means for providing a magnetic field is de-energized and outputting signals indicative thereof, and

and electronics package for generating said preselected control signals and for receiving signals from said detector means.

4,987,369

METHOD OF AND DEVICE FOR THE VOLUME-SELECTIVE DETERMINATION OF AND MR SPECTRUM BY MEANS OF SELECTIVE POLARIZATION TRANSFER PULSE SEQUENCES

Reurt P. Van Stapele; Arend Heerschap, and Jan A. Den Hollander, all of Eindhoven, Netherlands, assignors to U.S. Philips Corporation, New York, N.Y.

Filed Jun. 5, 1989, Ser. No. 361,204

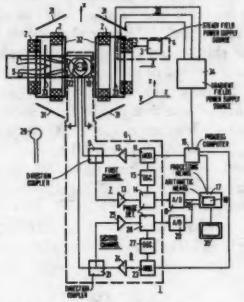
Claims priority, application Netherlands, Jun. 22, 1988, 8801588

Int. Cl.[5] G01R *33/20*

U.S. Cl. 324—307 **20 Claims**

1. A method of determining a spectrum from at least one magnetic resonance signal which is generated in a volume part of a body which contains a first and a second type of nucleus and which is arranged in a steady, uniform magnetic field, the resonance signal being obtained by polarization transfer from nuclear spins of the first type of nucleus to nuclear spins of the second type of nucleus in a first and a second pulse sequence of rf electromagnetic pulses which pulse sequences coincide at least partly, the first pulse sequence containing a first, a second and a third rf pulse, the second pulse sequence containing a fourth and a fifth rf pulse, the pulses being separated from one

another by waiting periods, characterized in that the volume part is selected during the application of the rf pulses by utiliz-



ing at least a first slice selective field gradient which coincides with the first rf pulse.

4,987,370

RF QUADRATURE COIL SYSTEM FOR AN MRI APPARATUS

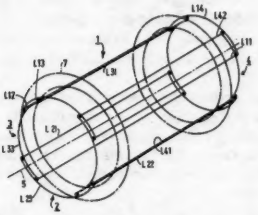
Christoph G. Leussler, and Andreas H. W. Wilchern, both of Hamburg, Fed. Rep. of Germany, assignors to U.S. Philips Corporation, New York, N.Y.

Filed Jun. 13, 1989, Ser. No. 366,101

Claims priority, application Fed. Rep. of Germany, Jun. 14, 1988, 3820169

Int. Cl.[5] G01R *33/20*

U.S. Cl. 324—318 **8 Claims**



1. An rf quadrature coil system for an MRI apparatus comprising:

two coil pairs, one pair being offset 90° with respect to the other pair and arranged for connection to an rf receiver or to an rf transmitter, said coil pairs defining an axis of symmetry;

each said pairs comprising two similar coils which are offset 180° with respect to one another on the circumference of a cylinder, each said similar coils comprising a first plurality of conductor sections which extend parallel to said axis and a second plurality of conductors lying in planes perpendicular to said axis;

means for tuning the two coils of each pair to the same resonance frequency; and

means for connecting only one coil of each said pairs to said receiver or transmitter.

4,987,371

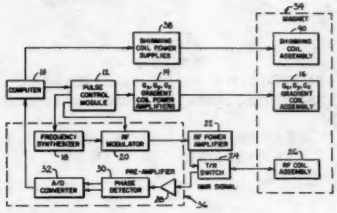
METHOD FOR IN-VIVO SHIMMING

Gary H. Glover, and Erika Schneider, all of Waukesha, Wis., assignors to General Electric Company, Milwaukee, Wis.

Filed Nov. 27, 1989, Ser. No. 441,850

Int. Cl.[5] G01R *33/20*

U.S. Cl. 324—320 **14 Claims**



1. A method of determining the spatial variation of magnetic field strength within an imaged object placed in a polarizing magnetic field, said imaged object including a first and second material with a first and second Larmor frequency, ω_1, ω_2, comprising the steps of:

acquiring a first NMR view set with a first evolution time t_{E1};

acquiring a second NMR view set with a second evolution time t_{E2} such that, for integers n,

$$t_{E1} - t_{E2} = n\frac{2\pi}{(\omega_1 - \omega_2)};$$

reconstructing a first and second complex multipixel image from each NMR view set;

dividing each pixel of the first complex multiplexel image by the corresponding pixel of the second multipixel image, on a pixel by pixel basis, to produce a complex multiplexel ratio image; and

calculating the argument of each pixel of the complex multipixel ratio image to produce an inhomogeneity map.

4,987,372

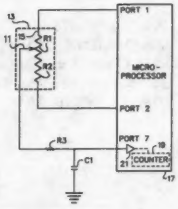
POTENTIOMETER STATE SENSING CIRCUIT

John Ofori-Tenkorang, Cambridge; David Otten, Newton, both of Mass., and Leo Casey, Briarcliff Manor, N.Y., assignors to Lutron Electronics Co., Inc., Coopersburg, Pa.

Filed Aug. 1, 1989, Ser. No. 388,197

Int. Cl.[5] G01R *27/02*

U.S. Cl. 324—705 **41 Claims**



1. A circuit for sensing a state of a potentiometer, having a first impedance device and a conductive element that electrically divides said impedance device into first and second ends, comprising, in combination:

(a) a second impedance device electrically connected to said conductive element, said second impedance device and

said first and second ends of said first impedance device having first and second time constants associated therewith, respectively,

(b) means for applying a voltage alternatively across said second impedance device and either end of said first impedance device, and

(c) means for measuring the relative values of said first and second time constants,

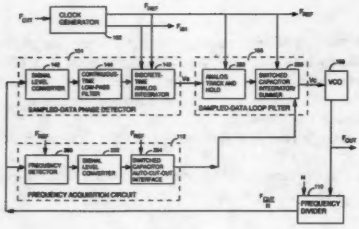
whereby the state of said potentiometer is determined by said relative values.

4,987,373

MONOLITHIC PHASE-LOCKED LOOP

David C. Soo, Milpitas, Calif., assignor to Chrontel, Inc., Milpitas, Calif.

Filed Sep. 1, 1989, Ser. No. 402,214
Int. Cl.[5] H03L *7/00*; G01R *1/00*
U.S. Cl. 328—155 **24 Claims**



1. A phase-locked loop circuit, comprising:

a sampled-data phase detector which detects phase error between a reference clock signal and a second signal and generates a phase error signal; said sampled-data phase detector including integrating means which repeatedly samples and integrates said second signal while said reference clock signal is in a predefined portion of its clock cycle, thereby generating said phase error signal;

sampled-data loop filter means, coupled to said sampled-data phase detector, for low pass filtering said phase error signal and for generating a filtered control signal;

voltage controlled oscillator means, coupled to said sampled-data loop filter means, for generating an output signal which oscillates at a frequency corresponding to said filtered control signal; and

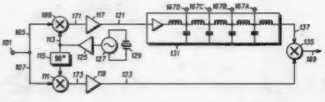
frequency divider means, coupled to said voltage controlled oscillator means and said sampled-data phase detector, for dividing said output signal and thereby generating said second signal, said second signal oscillating at a lower frequency than said output signal.

4,987,374

FSK DEMODULATOR

Dennis E. Burke, 3N455 Crown Rd., Elmhurst, Ill. 60126

Filed Oct. 5, 1989, Ser. No. 417,375
Int. Cl.[5] H03D *3/00*
U.S. Cl. 329—302 **11 Claims**



1. A detector (100) for an FM-modulated IF signal having a frequency deviation $\Delta\omega$, comprising:

splitting means for providing the IF signal to a first input (105) of a first product detector (109) and to a first input (107) of a second product detector (111),

oscillator means (127) for providing a signal at the IF frequency to the input of a 90° phase shift means (115) and to the input of a 0° or 360° phase shift means (113),

the 90° phase shift means output signal coupled to a second input of said second product detector (111),

the 0° or 360° phase shift means output signal coupled to a second input of said first product detector (109),

said first product detector output (171) coupled to the input (121) of a time-delay means (131) having a time-delay Δt that is based on the quotient $(90°/\Delta\omega)$,

the time-delay means output (137) coupled to a first input of a third product detector (135),

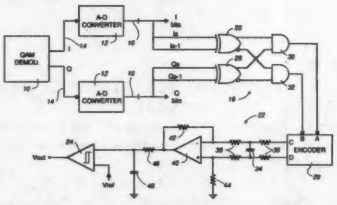
said second product detector output (173) coupled to a second input (123) of said third product detector (135).

4,987,375

CARRIER LOCK DETECTOR FOR A QAM SYSTEM

Kuang-Tsan Wu, and John D. McNicol, both of Nepean, Canada, assignors to Northern Telecom Limited, Montreal, Canada

Filed Feb. 15, 1990, Ser. No. 480,384
Int. Cl.[5] H04L *27/38*
U.S. Cl. 329—309 **9 Claims**



1. A carrier lock detector for a QAM system having signal points identified by a plurality of I bits and a plurality of Q bits respectively representing in-phase and quadrature-phase component amplitudes in a phase plane diagram, the phase plane diagram including first areas centered on respective signal points and second areas between the first areas, the detector comprising:

means (18) responsive to a plurality of less significant I bits (I2, I1) and a plurality of less significant Q bits (Q2, Q1) for producing a first signal (30 output) when a detected signal is in one of the first areas (52) and a second signal (32 output) when a detected signal is in one of the second areas (54);

means (20, 22) for producing an integrated difference of the first and second signals; and

means (24) for comparing the integrated difference with a threshold level to provide a carrier lock detection signal.

4,987,376

FREQUENCY SHIFTED LASER TRANSMITTER

John L. Hughes, Melbourne, Australia, assignor to Australian Electro Optics Pty Ltd., Australia

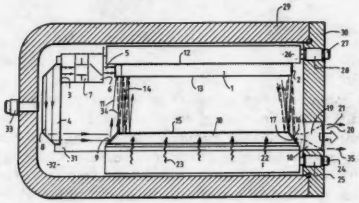
Filed Nov. 18, 1988, Ser. No. 274,320
Int. Cl.[5] H01S *3/30, 3/081, 3/045*
U.S. Cl. 330—4.3 **10 Claims**

1. A compact, single slab, laser oscillator-amplifier system, immersed in a high pressure container, comprising:

(a) a slab of laser gain medium with two face pairs of optically polished surfaces, one of the face pairs being perpendicular to the longest axis of said slab and of the smaller surface area corresponding to the width of said slab multiplied by its thickness, the other surface pair being of the

larger surface area corresponding to the length of said slab multiplied by its width, one of each of the surface pairs being dielectric layer coated to reflect 100% of the incident laser light, a mirror on the smaller surface being of elliptical cross-section, both other surfaces being antireflection coated to minimize laser beam reflection losses at the fundamental frequency with one face of each of said pairs of optically polished surfaces being mirrored to reflect said fundamental frequency generated within said slab laser medium;

(b) an optically transparent, bevelled mirror substrate, dielectric layer coated to reflect a laser beam of elliptical cross-section into said slab mirrored in such a manner as to maintain successive reflections of a primary and frequency shifted laser beam into and off the rear and front surfaces of said slab respectively and also bevelled to extract the frequency shifted laser beam from said system;



(c) optical means to define and switch a laser oscillator along the long axis of said slab and optical means of turning said laser oscillator output beam through 180 degrees so that it can be directed into the amplifier section of said system;

(d) cooled optical excitation source to excite said laser slab via the bevelled mirror substrate so that a narrow band excitation radiation matching the absorption bands of said laser gain medium is also reflected off the mirrored upper surface of said slab thus increasing its absorption path in said slab laser medium;

(e) cooling means positioned against the upper, mirrored surface of said slab; and,

(f) a high pressure gas enclosure in which said slab laser oscillator-amplifier system is immersed so as to provide a gaseous medium for the shifting of the generated fundamental laser frequency by factors of between 3 and 4 further into the middle infra-red from the range 1,000 nanometers to 2,900 nanometers.

4,987,377

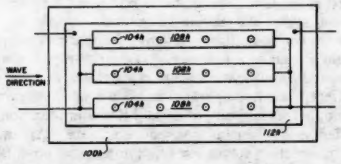
FIELD EMITTER ARRAY INTEGRATED DISTRIBUTED AMPLIFIERS

Henry F. Gray, Alexandria, Va., and Richard F. Greene, Bethesda, Md., assignors to The United States of America as represented by the Secretary of the Navy, Washington, D.C.

Continuation of Ser. No. 171,706, Mar. 22, 1988, Pat. No. 4,901,028. This application Oct. 31, 1989, Ser. No. 429,731

Int. Cl.[5] H03F *3/60*

U.S. Cl. 330—54 **8 Claims**



2. A distributed amplifier comprising:

an anode;

a cathode;

a grid; and

a dielectric means for a capacitance between said cathode and said grid, and for establishing a capacitance between said anode and said grid; wherein;

said cathode and said grid are adapted to form an input waveguide for said amplifier;

said anode and said grid are adapted to form an output waveguide for said amplifier;

said cathode comprises a plurality of field emitters, each field emitter of said plurality of field emitters being associated with a slot means in said grid for permitting electrons from said each field emitter to travel through said grid to said anode; and

the size, shape, and material of said cathode, grid, anode, and dielectric means are selected to cause:

(1) responsive to the presence of an electromagnetic signal in said input waveguide, the creation of an electromagnetic signal in said output waveguide; and

(2) both said signals to arrive at each of said plurality of field emitters substantially simultaneously; and wherein:

said grid is a plurality of strips in electrical parallel with one another; and

said anode is a generally planar strip cooperating with each of said plurality of strips to form said output waveguide.

4,987,378

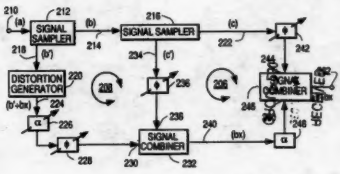
FEEDFORWARD PREDISTORTION LINEARIZER

Brian E. Eggleston, Pittstown, and Allen Katz, Trenton, both of N.J., assignors to General Electric Company, East Windsor, N.J.

Filed Nov. 28, 1989, Ser. No. 442,876

Int. Cl.[5] H03F *1/32*

U.S. Cl. 330—149 **14 Claims**



1. A predistortion equalizer for predistorting a signal to be predistorted, comprising:

first signal dividing means including an input port adapted to be coupled to a source of signal to be predistorted and also including first and second output ports, for producing, from said signal to be predistorted, first and second signal portions at said first and second output ports, respectively, of said first signal dividing means;

distortion generating means coupled to said second output port of said first signal dividing means for associating distortion products with said second signal portion to produce combined distorted signals;

second signal dividing means including an input port coupled to said first output port of said first signal dividing means for receiving said first signal portion therefrom, and also including first and second output ports, for dividing said first signal portion received from said first signal dividing means into first and second signal parts at said first and second output ports, respectively, of said second signal dividing means;

first signal combining means including a first input port coupled to said distortion generating means and a second input port coupled to said second output port of said second signal dividing means, and also including an output port, for completing a first loop for combining said combined distorted signals with said second signal part;

first phase and amplitude control means coupled with said first loop for controlling the relative phase and amplitude of said combined distorted signals and said second signal portion in a manner tending to cancel all but the distortion component of said combined distorted signals, whereby said distortion component is produced at said output port of said first combining means; and

second combining means including a first input port coupled to said first output port of said second signal dividing means and a second input port coupled to said output port of said first signal combining means thereby completing a second loop, said second combining means also including an output port, for combining said first signal part with said distortion component to produce predistorted signal at said output port of said second signal combining means.

4,987,379

OPERATIONAL AMPLIFIER CIRCUIT

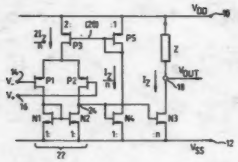
John B. Hughes, Hove, England, assignor to U.S. Philips Corporation, New York, N.Y.

Filed Aug. 24, 1989, Ser. No. 398,017

Claims priority, application United Kingdom, Sep. 5, 1988, 8820836

Int. Cl.[5] H03F *3/45*

U.S. Cl. 330—253 **23 Claims**



1. An operational amplifier circuit comprising:

matched transistors connected in a differential pair arrangement having a common terminal, first and second control terminals forming inputs of the amplifier and first and second output terminals;

a bias current source having an output connected to the common terminal of the differential pair arrangement;

a current mirror active load circuit having an input transistor and an output transistor connected to receive current from the first and second output terminals of the differential pair arrangement respectively; and

at least one output transistor having a control electrode connected to the second output terminal of the differential pair arrangement, said output transistor being connected to supply an output current of the amplifier to a load;

wherein the bias current source comprises means for supplying a bias current of predetermined proportion relative to the current flowing in the at least one output transistor so as to maintain equal voltages at said first and second output terminals for equal voltages applied to the first and second control terminals thereby to minimize a systematic offset voltage between the first and second output terminals of the differential pair arrangement when said output current forms all or a substantial part of the current flowing in the at least one output transistor.

4,987,380

GAIN CONTROLLED AMPLIFIER CIRCUIT

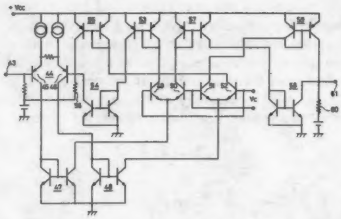
Tsutomu Ishikawa, Gunma, Japan, assignor to Sanyo Electric Co., Ltd., Moriguchi, Japan

Filed Aug. 7, 1989, Ser. No. 390,055

Claims priority, application Japan, Aug. 12, 1988, 63-202224

Int. Cl.[5] H03F *3/45*; H03G *3/30*

U.S. Cl. 330—254 **4 Claims**



1. A gain controlled amplifier circuit comprising:

input means for providing an input signal;

a prior stage amplifier circuit for amplifying said input signal, having a first input transistor having a base supplied with said input signal and providing a first output current from a collector and a second input transistor differentially connected to said first input transistor and providing a second output current from a collector;

first and second transistors differentially connected to each other, each having a base, an emitter and a collector;

third and fourth transistors differentially connected to each other, each having a base, an emitter and a collector;

a fifth transistor having a base, an emitter and a collector, the collector of said fifth transistor being connected to the emitters connected in common of said first and second transistors, and the base of said fifth transistor being connected to the collector of said first input transistor;

a sixth transistor having a base, an emitter and a collector, the collector of said sixth transistor being connected to the emitters connected in common of said third and fourth transistors, and the base of said sixth transistor being connected to the collector of said second input transistor;

gain control means for providing a gain controlling signal to the bases of said first through fourth transistors;

a negative feedback path for negative feeding back controller currents of said first and fourth transistors to the base of said second input transistor; and

output terminals for providing collector currents of said second and third transistors as output signals.

4,987,381

TUBE SOUND SOLID-STATE AMPLIFIER

Brent K. Butler, 6806 S. Norfolk St., Aurora, Colo. 80016

Filed Oct. 17, 1989, Ser. No. 422,738

Int. Cl.[5] H03F *3/45*

U.S. Cl. 330—255 **4 Claims**

1. An amplifier for simulating vacuum tube sonic characteristics using an electrical signal as an input signal comprising:

a first amplification stage having an input for receiving said input signal and having an output;

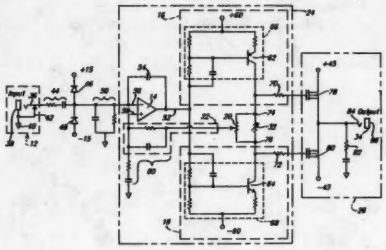
a means for providing a negative feedback signal path from said output to said input of said first amplification stage;

a second amplification stage comprising at least one field effect transistor operated in open loop configuration and coupled to said output of said first amplification stage;

power supply means connected to said first and second amplification stages for supplying a first potential to said first amplification stage and a second potential to said second amplification stage;

wherein said first potential is of a substantially greater mag-

nitude than said second potential, whereby said second amplification stage may be driven into saturation while said first amplification operates in a substantially linear regime;



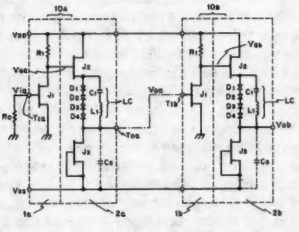
wherein said first stage comprises a differential amplifier having a first input coupled to receive said input signal and having a second input coupled to said feedback signal path and further comprises at least two bipolar transistor devices coupled to said differential amplifier in a push-/pull configuration.

4,987,382

MICROWAVE INTEGRATED CIRCUIT HAVING A LEVEL SHIFT CIRCUIT

Yasuo Saitoh, Tokyo, Japan, assignor to NEC Corporation, Japan

Filed Oct. 13, 1989, Ser. No. 421,240
Claims priority, application Japan, Oct. 14, 1988, 63-258508
Int. Cl.[5] H03F *3/16*
U.S. Cl. 330—277 **11 Claims**



1. A level shift circuit in a microwave integrated circuit comprising:

a first power supply terminal, a second power supply terminal, and an output terminal;

level shift diodes connected in series for level shifting;

a resistor having one terminal connected to said second power supply terminal;

a field effect transistor having a gate electrode receiving an input signal, a drain electrode connected to said first power supply terminal and a source electrode connected, through the series connection of said level shift diodes, to the other terminal of said resistance transistor and said output terminal; and

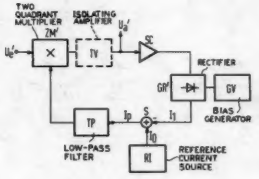
a peaking means provided in parallel with said level shift diodes for providing a flat frequency characteristic in a broad band ranging form D.C. to a microwave frequency.

4,987,383

INTEGRATED COMPRESSION AMPLIFIER HAVING PROGRAMMABLE THRESHOLD VOLTAGE

Manfred Mauthe, Munich, Fed. Rep. of Germany, assignor to Siemens Aktiengesellschaft, Berlin and Munich, Fed. Rep. of Germany

Filed Sep. 25, 1989, Ser. No. 412,166
Claims priority, application Fed. Rep. of Germany, Oct. 13, 1988, 3834928
Int. Cl.[5] H03G *3/30*
U.S. Cl. 330—279 **39 Claims**



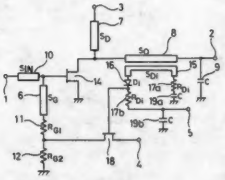
1. A compression amplifier having a two quadrant multiplier (ZM') and a feedback branch that contains a rectifier unit (GR') and a following low-pass filter (TP'), whereby one output of the low-pass filter (TP') is fed back onto the two quadrant multiplier (ZM') and the two quadrant multiplier (ZM') with a preceding voltage divider is connected between an input and an output ($U_{e'}$,$U_{a'}$) of the compression amplifier, comprising an amplifier having variable gain (SC) connected in the feedback branch between the rectifier unit (GR') and the output ($U_{a'}$) of the compression amplifier; the rectifier unit (GR') having a circuit for generating a bias voltage (GV) allocated to it; and a reference current source (RI) connected to a summation point (S) between the low-pass filter (TP') and the rectifier unit (GR').

4,987,384

HIGH FREQUENCY AMPLIFIER

Masahide Yamanouchi, and Tetsuro Mori, both of Itami, Japan, assignors to Mitsubishi Denki Kabushiki Kaisha, Japan

Filed Oct. 2, 1989, Ser. No. 415,610
Claims priority, application Japan, Oct. 7, 1988, 63-254346
Int. Cl.[5] H03F *3/16*
U.S. Cl. 330—286 **9 Claims**



1. A high frequency amplifier including:

a first field effect transistor for amplifying a first input signal and producing an amplified output signal;

an output detection section stripline having first and second ends for detecting the level of the amplified output signal;

a series connected first resistor and diode connected between the first end of said output detection section stripline and ground; and

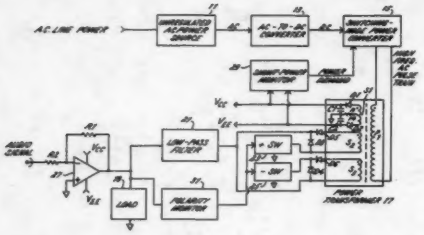
a second field effect transistor connected to the connection of said first resistor and diode to receive as a second input signal the signal at said node and to produce, in response thereto, a second output signal for biasing said first field effect transistor.

4,987,385

HIGH EFFICIENCY POWER AMPLIFIER

Rudolph H. Engelmann, 1749 Golf Rd., #155, Mount Prospect, Ill. 60056

Filed Nov. 22, 1989, Ser. No. 440,667
Int. Cl.[5] H03F 3/04
U.S. Cl. 330—297 20 Claims



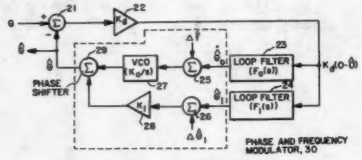
15. A method of driving a speaker comprising the steps of:
responding to the audio signal by applying a first power signal to the speaker by way of a non-linear amplifier; and
shunting a portion of the first power signal away from the speaker by way of a linear amplifier responsive to the audio signal in order to waveshape the first power signal.

4,987,386

COHERENT PHASE AND FREQUENCY RECOVERY METHOD AND CIRCUIT

John J. Pokiemba, Ijamsville, and James R. Thomas, Sandy Spring, both of Md., assignors to Communications Satellite Corporation, Washington, D.C.

Filed Oct. 3, 1989, Ser. No. 416,793
Int. Cl.[5] H03L 7/085
U.S. Cl. 331—10 15 Claims



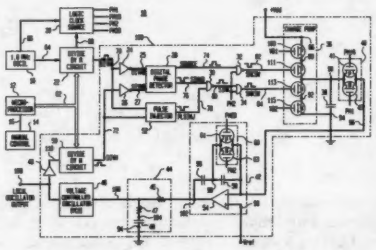
2. A method for recovering the phase and frequency of a received signal, comprising the steps of:
applying the received signal to a first input terminal of mixer means;
amplifying an output of said mixer means;
producing a frequency control signal in response to said received signal and the amplified output of said mixer means;
applying said frequency control signal to an input of a voltage-controlled oscillator to produce at an output of said voltage-controlled oscillator an oscillator signal having a frequency substantially equal to said frequency of said received signal but of arbitrary phase;
producing a phase control signal in response to said received signal and the amplified output of said mixer means;
correcting a phase of said oscillator signal with said phase control signal to produce a loop output signal; and
applying said loop output signal to a second input of said mixer means.

4,987,387

PHASE LOCKED LOOP CIRCUIT WITH DIGITAL CONTROL

Richard A. Kennedy, Kokomo, Ind.; Seyed R. Zarabadi, Columbus, Ohio; Stephen L. Inman, and Martin G. Gravenstein, both of Kokomo, Ind., assignors to Delco Electronics Corporation, Kokomo, Ind.

Filed Sep. 8, 1989, Ser. No. 404,793
Int. Cl.[5] H03L 7/093, 7/183
U.S. Cl. 331—1 A 21 Claims



1. Circuitry comprising:
a voltage controlled oscillator having an input and an output;
comparing means for comparing frequency and phase of a reference signal with a signal from the output of the voltage controlled oscillator, said comparing means being adapted to generate output signals having a duration corresponding to the phase difference between the reference signal and an output signal of the voltage controlled oscillator;
enable/disable signal means for generating at outputs thereof non-overlapping essentially complementary enable/disable signals;
a charge/discharge circuit having inputs and an output;
a charge storage element having one terminal coupled to the output of the charge/discharge circuit;
first gating means coupled between outputs of the comparing means and inputs of the charge/discharge circuit and having control inputs which are coupled to a first of the complementary enable/disable signals for controlling conduction between the comparing means and the charge/discharge circuit;
a loop filter having a first input and having an output coupled to the input of the voltage controlled oscillator: and
second gating means coupled between the output of the charge/discharge circuit and the first input of the loop filter and having a control input which is coupled to a second of the complementary enable/disable signals for controlling a conduction path between the charge discharge circuit and the loop filter whereby the comparing means is coupled to the charge/discharge circuit and the charge/discharge circuit is electrically isolated from the loop filter or the comparing means is electrically isolated from the charge/discharge circuit and the charge/discharge circuit is coupled to the loop filter.

4,987,388

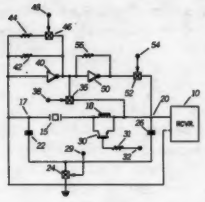
CRYSTAL OSCILLATOR OPERATED IN PARALLEL/SERIES MODE

Chacko Prakash; Yong K. Ng, and Pek B. Teo, all of Penang, Malaysia, assignors to Motorola, Inc., Schaumburg, Ill.

Filed May 3, 1990, Ser. No. 518,387
Int. Cl.[5] H03B 5/32
U.S. Cl. 331—158 14 Claims

1. A crystal oscillator comprising a crystal, an inductance, a capacitance and switching means for connecting said crystal and said capacitance in parallel to provide a first frequency in

a parallel mode of operation and for connecting said crystal and said inductance in series to provide a second frequency



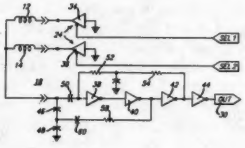
different than said first frequency in a series mode of operation, said first and second frequencies being separated by a predetermined amount.

4,987,389

LOCKPROOF LOW LEVEL OSCILLATOR USING DIGITAL COMPONENTS

Amnon Brosh, Montvale, and Wolf S. Landmann, Fair Lawn, both of N.J., assignors to Borg-Warner Automotive, Inc., Sterling Heights, Mich.

Filed Apr. 2, 1990, Ser. No. 503,395
Int. Cl.[5] H03B *5/08*; G08C *19/12, 21/00*
U.S. Cl. 331—167 **22 Claims**



1. An lockproof oscillator circuit comprising:

digital circuit means comprising first, second and third inverters coupled in series and each having an input and an output, the output of said first inverter coupled to the input of said second inverter and the output of said second inverter coupled to the input of said third inverter;

said digital circuit being operable between bistable high and low states;

a tank circuit comprising capacitance means and an inductance means coupled together to establish a resonant frequency and further coupled to the input of said first inverter;

negative feedback means coupled between the output of said third inverter and the input of said first inverter for biasing said digital circuit at an intermediate point between said high and low states;

positive feedback means coupled between the output of said second inverter and said tank circuit for delivering energy to said tank circuit and thereby inducing oscillation in said tank circuit at said resonant frequency;

said third inverter producing at the output a signal which oscillates between said high and low states in synchronism with the induced oscillation in said tank circuit;

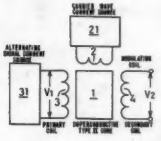
said positive feedback means including impedance means for restricting the amount of energy delivered to said tank circuit and thereby reducing the amplitude of said oscillations in said tank circuit without reducing the signal amplitude at the output of said third inverter.

4,987,390

SUPERCONDUCTING REVERSIBLE VARIABLE INDUCTOR

Kaneo Mouri, Nagoya; Masahide Wakuda, and Noriaki Baba, both of Kariya, all of Japan, assignors to Kabushiki Kaisha Toyoda Jidoshokki Seisakusho, Aichi, Japan

Filed Sep. 5, 1989, Ser. No. 403,090
Claims priority, application Japan, Sep. 14, 1988, 63-230541
Int. Cl.[5] H03C *1/00*
U.S. Cl. 332—173 **11 Claims**



1. A superconducting, reversible, variable inductor comprising:

a core made of a Type II superconductor having a reversible magnetic permeability variation range in which the magnetic permeability varies reversibly with respect to a variation of a magnetic field of a predetermined strength or less and falling in the range of from a lower critical magnetic field or more to an upper critical magnetic field or less; and

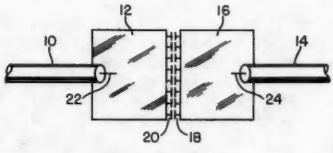
at least one coil wound around said core.

4,987,391

ANTENNA CABLE GROUND ISOLATOR

Michael Kusiak, Jr., 45 Cypress St., Yonkers, N.Y. 10704

Filed Mar. 14, 1990, Ser. No. 493,446
Int. Cl.[5] H01P *1/20*
U.S. Cl. 333—12 **14 Claims**



1. A coaxial cable isolator comprising:

an area of conductive input ground plane electrically connected to the shield conductor of an input coaxial cable to said isolator;

an area of conductive output ground plane electrically con-

nected to the shield conductor of an output coaxial cable to said isolator;

said input and output ground planes being separated and thereby electrically isolated from each other by a nonconducting gap;

a plurality of capacitive elements placed adjacent to one another in a substantially continuous fashion, bridging said gap over a considerable portion of its extent, thereby constituting a capacitive coupling across said gap; and

a coupling means electrically connected between the respective inner conductors of said input and output coaxial cables to said isolator.

4,987,392

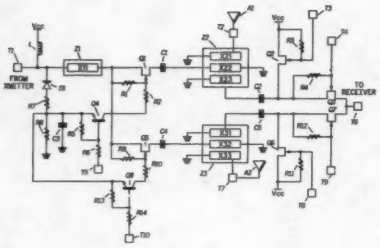
GALLIUM ARSENIDE ANTENNA SWITCH

Edward T. Clark, Plantation, and Enrique Ferrer, Miami, both of Fla., assignors to Motorola, Inc., Schaumburg, Ill.

Filed Oct. 17, 1988, Ser. No. 258,934

Int. Cl.[5] H01P *1//15*

U.S. Cl. 333—103 **14 Claims**



1. A switch, comprising in combination:

first transforming means for transforming impedance, said first transforming means having first and second ports, the impedance of said second port of said first transforming means being lower than the impedance of said first port of said first transforming means;

second transforming means for transforming impedance, said second transforming means having first, second and third ports, the impedance of said second port of said second transforming means being lower than the impedance of said first and third ports of said second transforming means;

first switching means for coupling said second port of said first transforming means to said second port of said second transforming means when said first switching means is switched ON;

converter means for converting signal at said first port of said first transforming means to a DC voltage; and

second switching means for coupling said converter means to said first switching means, when said second switching means is switched ON.

4,987,393

DIELECTRIC FILTER OF SOLID MOLD TYPE WITH FREQUENCY ADJUSTMENT ELECTRODES

Tadahiro Yorita, and Haruo Matsumoto, both of Kanazawa, Japan, assignors to Murata Manufacturing Co., Ltd., Japan

Filed Sep. 20, 1988, Ser. No. 246,762

Claims priority, application Japan, Sep. 21, 1987, 62-143973[U]

Int. Cl.[5] H01P *1/202*

U.S. Cl. 333—202 **10 Claims**

1. A dielectric filter of a solid mold type having a plurality of adjacent resonators and a construction for regulating respective resonant frequencies of the plurality of resonators, comprising

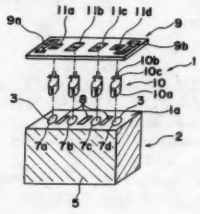
a dielectric block provided with a plurality of through holes which are formed parallel to each other in the dielectric block,

inner conductive films formed on inner peripheral surfaces of the through holes,

outer conductive films formed on portions of outside surfaces of the dielectric block and associated with said through holes so as to constitute the plurality of resonators,

a base plate,

electrode means for frequency adjustment formed on the base plate, including a plurality of respective adjustment electrodes which are electrically connected, via coupling members, to the inner conductive films of the respective resonators at first ends of said resonators, said first ends being at a first face of said dielectric block having no



conductive film, whereby the resonant frequencies of said resonators are adjustable to equalize them by adjusting a dimension of each respective adjustment electrode of each resonator and thereby adjusting a capacitance between said respective adjustment electrodes and said outer conductive films,

means on said coupling members for supporting said base plate adjacent to said first face of said dielectric block, and

respective coupling cavities formed through said dielectric block between adjacent pairs of resonators of the dielectric block, said coupling cavities having exposed ceramic surfaces therein with no conductive film being formed on said exposed ceramic surfaces of said cavities, said resonators being coupled to each other substantially only by said coupling cavities.

4,987,394

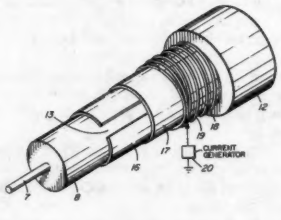
LEAKY CABLES

R. Keith Harman, Kanata, Canada, and Kenneth L. Smith, East Machias, Me., assignors to Senstar Corporation, Ontario, Canada

Filed Dec. 1, 1987, Ser. No. 130,192

Int. Cl.[5] H01Q *13/20*; H01P *3/02*

U.S. Cl. 333—237 **51 Claims**



1. In a cable structure, at least one leaky coaxial cable comprising an inner conductor, a dielectric surrounding the inner conductor, a first external shield having series impedance with

a low resistance at VHF frequencies surrounding the dielectric, a second external shield having series impedance which is high relative to the series impedance of the first external shield surrounding the first external shield, means associated with the shields for coupling magnetic field through the shields, and further means associated with the shields for limiting VHF conductive current between the first and second external shields.

4,987,395

CIRCUIT BREAKER ALARM-SWITCH OPERATING APPARATUS

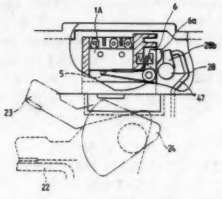
Seishiro Ozaki, and Nobuo Asahi, both of Kanagawa, Japan, assignors to Fuji Electric Co., Ltd., Kanagawa, Japan

Filed Apr. 19, 1990, Ser. No. 511,098

Claims priority, application Japan, Jul. 6, 1989, 1-174681

Int. Cl.[5] H01H *73/12*

U.S. Cl. 335—17 **9 Claims**



1. In a circuit breaker having a plurality of poles and means for performing a tripping operation, an alarm switch operating apparatus comprising:

a switch unit housed in each of said plurality of poles;

at least one alarm switch disposed in said switch unit for detecting said tripping operation of said circuit breaker;

a latch rotatably mounted in said switch unit;

rotating means communicating with said latch for rotating said latch;

latch receiver means rotatably supported in said switch unit in communication with said latch for preventing said latch from rotating in absence of said tripping operation;

rotatably supported in communication

crossbar means rotatably supported in communication with said latch receiver means, said crossbar means including an insulating bar which extends across said plurality of poles and a claw which engages with said latch receiver means; and

first actuating means disposed in said switch unit for actuating said at least one alarm switch, wherein when said tripping operation occurs said crossbar means is rotated to a tripped position by said means for performing said tripping operation, said claw portion and said latch receiver means disengage, said latch is rotated by said rotating means, said crossbar means is further rotated from said tripped position by said latch, and said actuating means activates said at least one alarm switch to emit an alarm signal.

4,987,396

ELECTROMAGNETIC SWITCH, IN PARTICULAR FOR STARTING DEVICES OF INTERNAL-COMBUSTION ENGINES

Karl-Heinz Bögner, Neuhausen/F, Fed. Rep. of Germany, assignor to Robert Bosch GmbH, Stuttgart, Fed. Rep. of Germany

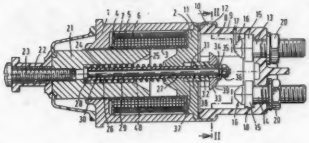
PCT No. PCT/DE87/00406, § 371 Date Mar. 24, 1989, § 102(e) Date Mar. 24, 1989, PCT Pub. No. WO88/02543, PCT Pub. Date Apr. 7, 1988

PCT Filed Sep. 4, 1987, Ser. No. 335,789

Claims priority, application Fed. Rep. of Germany, Sep. 24, 1986, 3632469

Int. Cl.[5] H01H *67/02*

U.S. Cl. 335—126 **9 Claims**



1. An electromagnetic switch in particular for starting devices of internal combustion engines, said electromagnetic switch having a longitudinal axis and comprising a housing having a switching space and an end; an exciter coil; a winding carrier for supporting said exciter coil; a guide sleeve located in said housing for supporting said winding carrier with said exciter coil; a magnet core arranged on said end face of said housing; a magnet armature guided in said guide sleeve; a return spring for biasing said magnet armature away from said magnet core; a switching bolt displaceable with said magnet armature and extending through said magnet core and into said switching space; a contact bridge carrier carried by said switching bolt; a contact bridge supported by said contact bridge carrier; a cap for covering said switching space; and two primary current contacts extending through said cap and into said switching space and located opposite said contact bridge, each of said primary current contact having at least one prismatic contact section inclined at an angle of 25°–60° to the longitudinal axis of said electromagnetic switch, said contact section including a plurality of contact surface each having a longitudinal axis inclined to the longitudinal axis of said electromagnetic switch and lying in a plane extending radially through the longitudinal axis of said electromagnetic switch, said contact bridge being round and including a spherical contact surface having a center of curvature which lies on the longitudinal axis of said electromagnetic switch, and a first radius, each of said contact surfaces being rounded and having a second radius which is greater than the first radius of said spherical contact surface of said contact bridge.

4,987,397

ELECTROMAGNETIC PROTECTIVE SWITCHING DEVICE

Kurt Held, Amberg, Fed. Rep. of Germany, assignor to Siemens Aktiengesellschaft, Berlin and Munich, Fed. Rep. of Germany

Filed Aug. 25, 1989, Ser. No. 398,655

Claims priority, application Fed. Rep. of Germany, Aug. 29, 1988, 8810908[U]

Int. Cl.[5] H01H *3/60, 67/02*

U.S. Cl. 335—131 **4 Claims**

1. An electromagnetic switching device comprising:

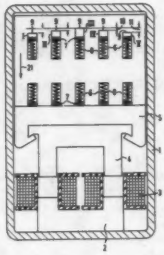
a housing;

a magnet system with a magnet yoke and an armature;

a contact bridge carrier coupled to said armature said contact bridge carrier being movably guided in the housing, and having a central longitudinal axis parallel to an actuating direction in which the carrier moves;

switching contacts carried by said contact bridge carrier and which are arranged at right angles to said actuating direction, said switching contacts forming make or break contacts; and

outer and middle stops for the switching contacts in the contact bridge carrier, said outer stops being symmetrically arrayed about said central longitudinal axis, said outer and middle stops having a varying dimension as measured along the longitudinal axis such that the outer stops contact the switching contacts before the middle stops when the contact bridge carrier is moved in the actuating direction.



4,987,398

MULTILAYERED EDDY CURRENT TYPE POWER-SAVED INTENSE AC MAGNETIC FIELD GENERATOR

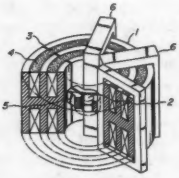
Kazuo Bessho, Hashiba, Japan, assignor to Kanazawa University, Kanazawa, Japan

Filed Jan. 26, 1990, Ser. No. 470,767

Claims priority, application Japan, Jan. 31, 1989, 1-19431

Int. Cl.[5] H01F *3/00, 5/00*

U.S. Cl. 335—299 **4 Claims**



1. A multilayered eddy current type power-saved intense AC magnetic field generator comprising: a plurality of layers of exciting coils mutually engaged in coaxial state and wound with the same polarity, a plurality of layers of conductor plates alternately stacked between each layer of said exciting coils and provided commonly with slits passing through to the outskirts from central holes axially formed at central portion of said conductor plates including a connecting conductor plate provided in common with said conductor plates except said slits and hollows formed in the vicinities of said central holes and passing through with each other, and a plurality of frame-shaped magnetic materials which are formed as closed magnetic circuits surrounding cross-sections of a plurality of alternate layers of said exciting coils and said conductor plates through said hollows, so as to generate an axial-directioned intense AC magnetic field in said central holes by concentrating eddy currents induced in said conductor plates in the vicinities of said central holes along said slits by supplying an AC current to said exciting coils and to reduce the required exciting currents through the impedances of said exciting coils which are increased by said closed magnetic circuits.

4,987,399

ELECTRIC COIL ASSEMBLY

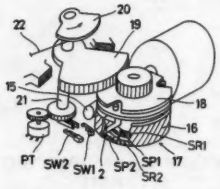
Mamoru Nakamura, and Hideya Hori, both of Aichi, Japan, assignors to Aisin Seiki Kabushiki Kaisha, Kariya, Japan

Filed Oct. 2, 1989, Ser. No. 415,752

Claims priority, application Japan, Sep. 30, 1988, 63-128556[U]

Int. Cl.[5] H01F *15/10*

U.S. Cl. 336—192 **2 Claims**



1. An electric coil assembly comprising a bobbin, a coil of electrically conductive wire wound on said bobbin, electric terminal means disposed on one side of said bobbin, means for electrically connecting opposite ends of said coil to said terminal means and electrically conductive spring means operatively connected to said terminal means and arranged for sliding contact with electrically conductive strips on a substrate for transferring current from said strips to said coil,

wherein said terminal means is comprised of a pair of U-shaped electrically conductive terminals embedded in said bobbin with each terminal having a pair of projecting pole portions and said opposite ends of said coil are connected to one pole of each pair of pole portions, respectively.

4,987,400

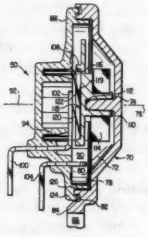
MAGNETICALLY DRIVEN VARIABLE RESISTOR GAUGE

Nicholas M. G. Fekete, Richardson, Tex., assignor to Rochester Gauges, Inc., Dallas, Tex.

Filed Aug. 11, 1989, Ser. No. 393,523

Int. Cl.[5] H01C *10/32*

U.S. Cl. 338—164 **6 Claims**



1. A magnetically driven variable resistor gauge, comprising:

a plastic base having a base axis and defining a cavity, a rim being formed about the cavity on the base, a pin extending from the base into the cavity;

a plastic cap having a cap axis;

an annular resistance wire mounted in the cap concentric to the cap axis, the resistance wire having a first end and a second end;

a ground terminal mounted in the cap, the ground terminal extending over the cap axis;

a wire terminal mounted in the cap and electrically connected to the first end of the resistance wire;

a pointer assembly, including:

a pointer with a recess to receive the pin, permitting the pointer to pivot about the base axis;

a magnet mounted on the pointer to pivot the pointer; and

a conductive contact plate mounted on the pointer assembly, the plate having a resilient ground contact contacting the ground terminal and a resilient wire contact contacting the resistance wire at a position determined by the position of the pointer.

4,987,401

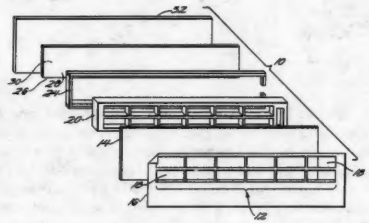
DIGITAL LOGIC WINDOW PANEL

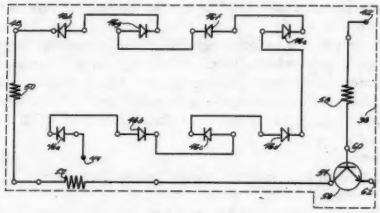
William R. Gray, III, 308 Fireside Dr., Columbia, S.C. 29210

Filed Mar. 6, 1989, Ser. No. 319,163

Int. Cl.[5] G08B *5/00*

U.S. Cl. 340—332 **11 Claims**





1. A device for use with a data receiver for alerting that a logic variable associated with data processed by said data receiver has changed from a nominal condition to a special condition upon receipt by said device of an electrical signal responsive to the condition of said logic variable, said device comprising:

an array of at least four light-emitting diode in series for backlighting a word or symbol;

electronic circuitry means in operative connection with said array of light-emitting diodes and said data receiver, said circuitry means for energizing said array of light-emitting diodes when said logic variable changes to said special condition from said nominal condition and for deenergizing said array of light-emitting diodes when said logic variable changes to said nominal condition from said special condition, said circuitry means conducting when said logic variable is in said special condition but not conducting when said logic variable is in said nominal condition, said array backlighting said word or symbol when said circuitry means is conducting; and

a sealed frame housing said circuitry means and said array of light-emitting diodes, said frame having a substantially opaque back, substantially opaque sides and a translucent cover through which cover said array of light-emitting diodes radiates light.

4,987,402

ALARM SYSTEM FOR SENSING AND VOCALLY WARNING OF AN UNAUTHORIZED APPROACH TOWARDS A PROTECTED OBJECT OR ZONE

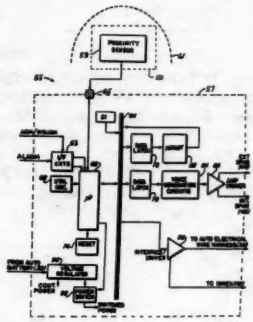
Michael Nykerk, Encino, Calif., assignor to Electronic Security Products of California, Canoga Park, Calif.

Continuation-in-part of Ser. No. 260,933, Oct. 21, 1988, Pat. No. 4,897,630, which is a continuation-in-part of Ser. No. 5,873

This application Oct. 11, 1989, Ser. No. 423,987

Int. Cl.[5] B60R *25/10*; B60Q *1/00*

U.S. Cl. 340—426 **23 Claims**



13. A method of protecting an object from unauthorized tamper or entry comprising:

defining an area surrounding said object;

sensing any entry of a person into said defined area; and

warning said person using synthetically generated speech that he or she is too close to the object and instructing the person to move back away from the object or else an alarm will sound;

whereby the object is protected by preventing a person from getting too close to the object.

4,987,403

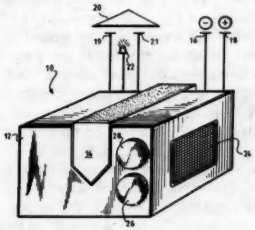
SELF CONTAINED DEVICE FOR GIVING AUDIBLE MESSAGES TO OCCUPANTS OF A VEHICLE

Stephen M. Apfel, P.O. Box 1134, Brooklyn, N.Y. 11240

Filed Jan. 16, 1990, Ser. No. 465,774

Int. Cl.[5] B60Q *1/00*

U.S. Cl. 340—457 **12 Claims**



1. A self contained device for giving audible messages to occupants of a vehicle, comprising:

(a) a housing having a top, a side, and a front;

(b) a power source disposed remotely from said housing;

(c) a hook and loop fastening strap disposed on said top of said housing so that the self contained device for giving audible messages to occupants of the vehicle can be mounted under the dashboard of the vehicle;

(d) a first negative electrode disposed from said housing;

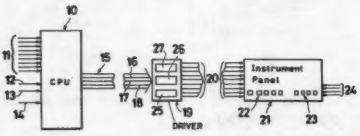
(e) a first positive electrode disposed from said housing, said first positive electrode and said first negative electrode together connecting the self contained device for giving audible messages to said remote power source;
(f) a normally open switch disposed remotely from said housing;
(g) a light emitting diode;
(h) a second negative electrode disposed from said housing; and
(i) a second positive electrode disposed from said housing, said second positive electrode and said second negative electrode together connecting said normally open switch to said light emitting diode.

4,987,404

CONTROL UNIT FOR THE PILOT LAMPS OF THE INSTRUMENT BOARD OF AN AUTOMOTIVE VEHICLE

Alessandro Gerosa; Edoardo Rogora, both of Milan; Ezio Villa, Arese, and Andrea Susa, Vanzago, all of Italy, assignors to Alfa Lancia S.p.A., Arese, Italy

Filed May 10, 1988, Ser. No. 192,694
Claims priority, application Italy, May 13, 1987, 20506 A/87
Int. Cl.[5] B60Q *1/00*
U.S. Cl. 340—461 **4 Claims**



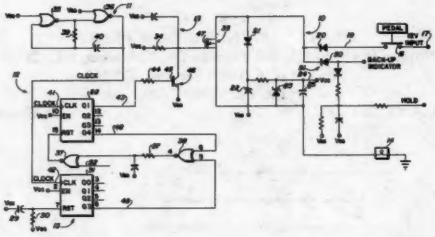
1. A control unit for pilot lamps which displays the operative condition of a number of sensors and the critical conditions of a number of sensor monitored devices of an automotive vehicle equipped with an engine, said control unit comprising a central control unit, first actuation means being driven by an engine starting key which sends an actuation signal whereby said central control unit is energized, said central control unit being operatively connected with a first group of pilot lamps and with a first group of sensors, each sensor of said first group of sensors having a first signal which indicates the operative condition of the respective sensor and having a second signal which indicates the critical condition of a particular monitored device, the first and second signals of each sensor of said first group of sensors being fed to said central control unit upon energizing by said first actuation means, a second group of pilot lamps operatively connected to said central control unit, a second group of sensors having a signal which indicates the critical condition of a particular monitored device, the signal of each sensor of said second group of sensors being directly fed to the pilot lamps of said second group of pilot lamps, said central control unit upon being energized by said first actuation means energizes each lamp of said first and second groups of pilot lamps whereby all lamps are lighted and viewable by an operator of the automobile vehicle indicating the functionality of all pilot lamps, said central control unit continues monitoring the second signals of each sensor of said first group of sensors, and energizes a particular pilot lamp associated with the sensor from which a second signal indicating the critical condition of the particular monitored device is received whereby the operator of the automobile vehicle will visually be alerted by the lighted pilot lamp, second actuation means being hand-controlled for sending an actuation signal to said control unit to energize each pilot lamp of both said first and second groups of pilot lamps whereby each pilot lamp is lighted to verify the functionality of each pilot lamp, and driver means operatively being connected to said central control unit and pilot lamps of said first and second groups of pilot lamps for sending excitation signals for said pilot lamps in the presence of the actuation signals of said first and second actuation means whereby the functionality of each pilot lamp is verified.

4,987,405

ELEVATED BRAKE LIGHT SIGNAL MODULE

Walter T. Jakobowski, 1208 Orange Isle, Ft. Lauderdale, Fla. 33315

Filed Jun. 4, 1990, Ser. No. 532,876
Int. Cl.[5] B60Q *1/44*
U.S. Cl. 340—479 **4 Claims**



1. A vehicle braking system including at least one brake light, means for energizing said brake light including a power source, a brake switch connected between said power source and said brake light and a brake pedal connected to said brake switch, said brake switch being actuated by pressure applied to said brake pedal, a brake alert warning module comprising:
a first means connected between said brake switch and said brake light for rapidly flashing said brake light on and off several times before assuming an on condition, the flashing and the on condition being repeated in a sequential manner,
said first means comprising a MOSFET transistor comprising a gate which conducts current to said brake light immediately upon closing of said brake switch and another transistor comprising an anode, cathode and base for controlling the current flow through said MOSFET transistor,
a counter,
the base of said another transistor being connected to said counter,
an oscillator connected to said counter for providing clock pulses to said counter,
said counter generating a series of electrical pulses in a cyclic manner for applying to the base of said another transistor,
said transistor generating a series of pulses which are applied to said gate of said MOSFET transistor for interrupting in a cyclic manner, current flow through said MOSFET transistor and in turn current flow through said brake light.

4,987,406

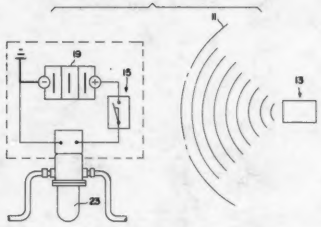
SECURITY SYSTEM FOR ELECTRICAL APPLIANCES AND OTHER ITEMS WITH ELECTRICAL CIRCUITRY

Philip L. Reid, 400 S. Danzler Rd., Duncan, S.C. 29334

Continuation of Ser. No. 240,547, Sep. 6, 1988, abandoned, which is a continuation-in-part of Ser. No. 37,701, Apr. 13, 1987, Pat. No. 4,791,409. This application Nov. 17, 1989, Ser. No. 437,776
Int. Cl.[5] G08B *21/00*
U.S. Cl. 340—539 **1 Claim**

1. A security system for a portable device with electrical circuitry comprising:
a portable signal source for emitting a coded signal over a predetermined range;
a receiver for said emitted signal attached to said electrical circuitry of said portable device;

normally open switch means comprising a circuit actuated by said receiver, said means being activated and closed thereby rendering said portable device operable, when said portable signal source is within said predetermined range; and



a battery for operating said electrical circuitry; said switch means "when deactuated " preventing drain on said battery.

4,987,407

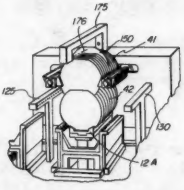
WAFER INTERLEAVING WITH ELECTRO-OPTICAL SAFETY FEATURES

Steven N. Lee, Irvine, Calif., assignor to Asq. Boats, Inc., Tustin, Calif.

Continuation of Ser. No. 185,091, Apr. 22, 1988, abandoned, which is a continuation-in-part of Ser. No. 65,346, Jun. 23, 1987, abandoned. This application Mar. 6, 1989, Ser. No. 319,796

Int. Cl.[5] G01B *11/04*

U.S. Cl. 340—540 **6 Claims**



1. A safety device including an alarm for wafer interleaving machine adapted to interleave a group of widely spaced parallel wafers with another group of widely spaced parallel wafers to form closely spaced interleaved wafers from said groups, such safety device comprising:

first comb means for holding said first group of spaced parallel wafers in a position to be interleaved;

second comb means holding said second group of spaced parallel wafers and for interleaving said first and second groups together to form one closely spaced group of interleaved wafers;

means response to an improperly positioned one of said wafers in either group for causing said first comb means to move slightly; and

means responsive to said comb's movement for activating said alarm.

4,987,408

WATER SENSOR SYSTEM

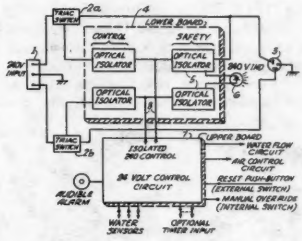
Robert C. Barron, 258 SE. 4th Ave., Pompano Beach, Fla. 33060

Filed May 10, 1989, Ser. No. 351,455

Int. Cl.[5] G08B *21/00*

U.S. Cl. 340—604 **19 Claims**

7. A water detector system as claimed in claim 5, in which said means for providing a continuous electrical current path includes two spaced apart water probes; wherein said means for converting alternating current to direct current includes a full wave diode rectifier positioned across the drain and source of a field effect transistor, said full wave diode rectifier electrically connected to said isolating means for protecting personnel; and, wherein said means for providing a continuous electrical current path also includes two resistors positioned so as to bias the gate of said field effect transistor between the drain



and gate of said field effect transistor, to turn on said field effect transistor in the event of the presence of water between said water probes, said water probes electrically connected in series with said resistor positioned between said gate and said drain, said water probes and the water therebetween being integral electrically conducting elements of the circuit between said gate and said drain of said field effect transistor.

4,987,409

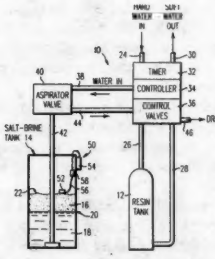
LEVEL SENSOR AND ALARM

Ronald E. Jackson, 216 W. Southport Rd., Indianapolis, Ind. 46217

Filed Apr. 24, 1989, Ser. No. 342,090

Int. Cl.[5] G08B *21/00*

U.S. Cl. 340—623 **12 Claims**



1. An alarm system for use with a water softener including a salt-brine tank containing a bed of salt comprising:

a sensor situated in the salt-brine tank on the top of the bed of salt, an electronic circuit including an alarm, and an input for connecting the circuit to the sensor, the sensor including means responsive to direct contact with the brine for operating the circuit to initiate the alarm in the event the top of the bed of salt drops below a preselected level or the brine rises above another preselected level,

wherein the sensor comprises a pair of conductors having a first end connected to the input of the circuit and a second end situated on the top of the bed of salt,

wherein the sensor further comprises an attitude responsive witch means connected to the second end of the pair of conductors, and

wherein the sensor further comprises buoyant means for

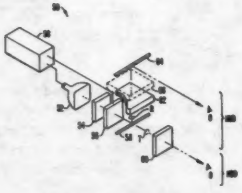
causing the switch means to float at or near the surface of any brine rising above the top of the bed of salt.

4,987,410

MULTIPLE IMAGE FORMING APPARATUS

Arthur L. Berman, San Jose, and Thomas M. Lewis, Santa Cruz, both of Calif., assignors to Kaiser Aerospace & Electronics Corporation, Oakland, Calif.

Filed Dec. 18, 1989, Ser. No. 455,896
Continuation-in-part of Ser. No. 147,834, Jan. 25, 1988, abandoned
Int. Cl.[5] G09G 1/00
U.S. Cl. 340—705 17 Claims



1. An apparatus for directing a plurality of images from an image source, which generates a first and a second image having a first and a second wavelength, along a first and a second optical path, comprising:

means for converting incident radiation of the first wavelength to a first polarization;

means for converting incident radiation of the second wavelength to a second polarization;

a beam splitter, disposed along the first and second optical paths, for transmitting a first portion of said converted incident radiation along said first optical path and reflecting a second portion of said converted radiation along said second optical path, said transmitted first portion has radiation of said first wavelength polarized in said first polarization and said second wavelength polarized in said second polarization,

said reflected second portion has radiation of said first wavelength polarized in a third polarization, orthogonal to said first polarization, and said second wavelength polarized in a fourth polarization, orthogonal to said second polarization;

a first shutter means, disposed along said first optical path and responsive to a first filter signal, for reflecting said first wavelength and passing said second wavelength of said transmitted first portion of said converted radiation;

a second shutter means, disposed along said first optical path and responsive to a second filter signal, for reflecting said second wavelength and passing said first wavelength of said transmitted first portion;

a third shutter means, disposed along said second optical path and responsive to a third filter signal, for reflecting said first wavelength and passing said second wavelength of said reflected second portion of said converted radiation;

a fourth shutter means, disposed along said second optical path and responsive to a fourth filter signal, for reflecting said second wavelength and passing said first wavelength of said reflected second portion; and

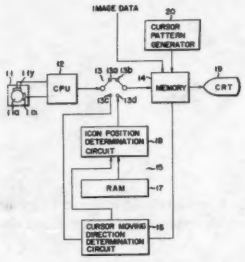
a timing device for providing said first, second, third and fourth filter signals to selectively pass desired images of said first and second wavelength along said first and second optical paths.

4,987,411

POINTING APPARATUS

Hidetoshi Ishigami, Ootawara, Japan, assignor to Kabushiki Kaisha Toshiba, Kawasaki, Japan

Filed Jul. 1, 1988, Ser. No. 214,257
Claims priority, application Japan, Jul. 2, 1987, 62-166203
Int. Cl.[5] G06F 7/00; G09G 1/00
U.S. Cl. 340—709 6 Claims



1. A pointing apparatus for immediately moving a cursor from a current position to a position of one of a plurality of objects displayed on a display in response to displacement of an input device, comprising:

means for generating a two-dimensional displacement signal corresponding to the displacement of said input device;

means for determining a cursor move direction in accordance with said two-dimensional displacement signal and said current position of said cursor, and for determining said position of the one of said plurality of objects which is displayed most nearly along said cursor move direction; and

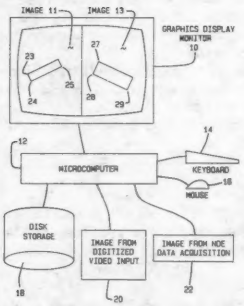
means for moving said cursor to said position of said one of said plurality of objects displayed on said display in response to said determining means.

4,987,412

METHOD AND APPARATUS FOR THE SIMULTANEOUS DISPLAY AND CORRELATION OF INDEPENDENTLY GENERATED IMAGES

Jeffrey J. Vaitekunas, Chicago, Ill., and Ronald A. Roberts, Crown Point, Ind., assignors to The United States of America as represented by the United States Department of Energy, Washington, D.C.

Filed Aug. 25, 1988, Ser. No. 236,582
Int. Cl.[5] G09G 5/08
U.S. Cl. 340—721 8 Claims



1. A method of visually demonstrating a location of an image of an object which corresponds to a selected location on an-

other image of the object and simultaneously visually identifying those locations with sufficient accuracy to permit comparison of Nondestructive Evaluation results, said method comprising:

(a) displaying a plurality of images of an object on a monitor of an interactive display system;

(b) locating three or more landmarks on each displayed image of the object on the monitor;

(c) selecting one image as the reference image;

(d) calculating mapping functions from the selected reference image to each other displayed image using the landmark locations;

(e) selecting a location of interest in the reference image;

(f) identifying the location on each displayed image that corresponds to the selected location on the reference image; whereby locations that can be visually located on one image are visually demonstrated in other images that may contain Nondestructive Evaluation results to be correlated to the selected location.

4,987,413

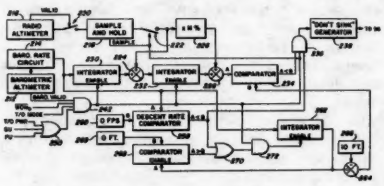
AIRCRAFT TERRAIN WARNING SYSTEM WITH CONFIGURATION MODIFIED WARNING AND IMPROVED MODE SWITCHING

Michael M. Grove, Snohomish, Wash., assignor to Sundstrand Data Control, Inc., Redmond, Wash.

Continuation of Ser. No. 704,348, Feb. 22, 1985, abandoned, and a continuation of Ser. No. 704,366, Feb. 22, 1985, abandoned. This application Jun. 4, 1987, Ser. No. 58,111

Int. Cl.[5] G08B *23/00*

U.S. Cl. 340—970 **11 Claims**



1. A ground proximity warning system for aircraft comprising:

a source of signals representing aircraft flight parameters;

a source of signals representative of the power level of the engine of the aircraft;

first warning means responsive to said flight parameter signals for generating a warning in accordance with a first predetermined relationship between flight parameters;

second warning means responsive to said flight parameter signals for generating a warning signal in accordance with a second predetermined relationship between flight parameters;

means responsive to said power level signals for providing a signal representative of take-off power; and

means responsive to said take-off power signal for enabling said first warning means to be generated only if said take-off power signal is present;

wherein said take-off power signal providing means includes means for relaying the generation of the take-off power signal for a first predetermined time interval after an engine has reached take-off power, and means for delaying the take-off power signal by a second predetermined time interval when the speed of the aircraft exceeds a predetermined air-speed.

4,987,414

SIGNAL PROCESSING CIRCUIT FOR AN ENCODER

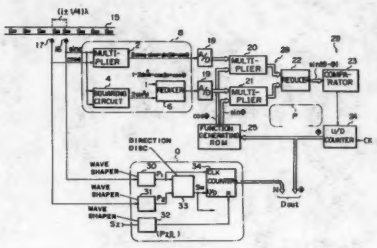
Kenzaburou Iijima, and Yoshinori Hayashi, both of Shizuoka, Japan, assignors to Yamaha Corporation, Japan

Filed Jul. 7, 1989, Ser. No. 376,694

Claims priority, application Japan, Jul. 8, 1988, 63-170599

Int. Cl.[5] H03M *1/22*

U.S. Cl. 341—15 **7 Claims**



1. A signal processing circuit for an encoder, comprising:

first and second magnetic sensors arranged facing a magnetized track on a scale to issue, in response to relative movement between said scale and said magnetic sensors, original analog sine and cosine wave signals representative of a magnetized pattern on said track;

an analog processing unit connected to said first and second magnetic sensors to issue, as a function of said original analog sine and cosine wave signals, converted analog sine and cosine wave signals of n-times a basic frequency associated with said original analog sine and cosine wave signals, wherein n is an integer greater than 1;

first and second A/D converters connected to said analog processing unit for converting said converted analog sine and cosine wave signals into corresponding digital output signals;

a function generating ROM for issuing cosine and sine values of given prescribed data;

first and second multipliers connected, at input sides thereof, to said first and second A/D converters and to said function generating ROM and being effective to issue a first output comprising a first product of said digital output signal from said first A/D converter and said cosine value from said function generating ROM, and a second output comprising a second product of said digital output signal from said second A/D converter and said sine value from said function generating ROM;

a first reducer connected to said first and second multipliers for providing a difference between said first and second products; and

a counter connected to said first reducer, via a comparator, for counting differences issued by said first reducer in a mode depending upon the polarity of said differences to issue a count value for being supplied to said function generating ROM;

said first and second multipliers, said function generating ROM and said counter forming a digital phase locked loop and issuing said count value as displacement data.

4,987,415

HIGH RESOLUTION ENCODER

A. John Santos, Canton Center, and Michael C. Brauer, Goshen, both of Conn., assignors to The Torrington Company, Torrington, Conn.

Filed Sep. 18, 1989, Ser. No. 408,592

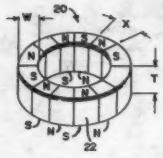
Int. Cl.[5] H03M *1/22*; G01P *3/42*

U.S. Cl. 341—15 **14 Claims**

1. An encoder comprising a magnetizable member having a thickness and a width, and multiple magnetic pole pairs (MPP)

spaced at equal intervals along said member, said MPP having a pole spacing between adjacent pole pairs, said pole spacing having a range of values from about 0.010 inch to about 0.050 inch, each of said MPP having a reference magnetic flux density (F_r) value in the range of about 2 gauss to about 700 gauss at a distance of 0.036 inch from the encoder surface at a temperature of about +20 degrees Centigrade,

each of said F_r values being related to a range of pole spacing values by the equation:



$$F_r=(K_1)(X)-(K_2)(140X^2)+(K_3)(7920X^3),$$

where

K_1=158 to 1056 gauss per inch,

K_2=158 to 1056 gauss per inch^2,

K_3=158 to 1056 gauss per inch^3,

X=Pole Spacing between adjacent MPP, and

F_r=Reference magnetic flux density range (in gauss) at +20 degrees Centigrade, when the numerical values of K_1, K_2, and K_3 are equal.

4,987,416

ANALOG TO DIGITAL CONVERTERS

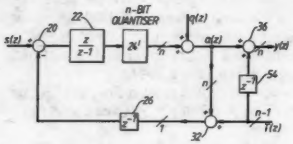
Thomas C. Leslie, Kislingbury, England, assignor to Plessey Overseas Limited, Ilford, England

Filed Aug. 8, 1989, Ser. No. 390,545

Claims priority, application United Kingdom, Sep. 6, 1988, 8820878

Int. Cl.[5] H03M *1/06*

U.S. Cl. 341—118 **12 Claims**



1. An analog-to-digital converter circuit comprising a differencing means for comparing an analog input signal and a feedback signal to provide an output dependent on the difference between the signals, a feed-forward filter coupled to receive the differencing means output for providing low-frequency preemphasis, and coupled to the input of an n-bit quantiser (where n>1) for providing an output signal comprising an n-bit representation of the signal applied to its input, a means for truncating the quantiser output signal to the MSB and for providing a feed back signal whose value is dependent on the MSB, a feedback filter means coupled to receive the feedback signal and provide it to the differencing means, and correction means for providing a correction signal for combining with the quantiser output signal, to provide a converter circuit output signal which compensates for the effect of the truncation in the feedback loop.

4,987,417

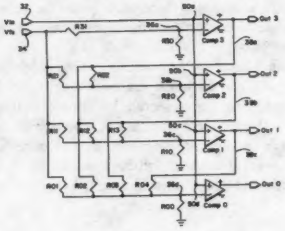
ADAPTIVE REFERENCING ANALOG-TO-DIGITAL CONVERTER

Dennis J. Buckland, Bethpage, N.Y., assignor to Grumman Aerospace Corporation, Bethpage, N.Y.

Filed Feb. 27, 1990, Ser. No. 485,627

Int. Cl.[5] H03M *1/36*

U.S. Cl. 341—159 **13 Claims**



1. Circuit for converting a varying input analog voltage to a digital signal, comprising:

a plurality of comparator means including a highest order comparator means and a lowest order comparator means, each comparator means capable of at least two output states;

resistor means associated with each comparator means for establishing, from a reference voltage, a different bias voltage for each comparator means, the established bias voltages decreasing incrementally in value from the highest order comparator means to the lowest order comparator means;

feedforward means associated with all but the lowest order comparator means for providing a feedforward to succeeding lower order comparator means so that the bias voltage of each succeeding lower order comparator means is shifted in response to a change in the output state of at least one of its preceding higher order comparator means;

wherein the analog voltage is fed to each comparator means and compared with the respective bias voltages of the comparator means to provide at the output of each comparator means one of the two output states; and

wherein any varying of the analog voltage is accompanied by a shifting of at least one of the respective bias voltages, other than the bias voltage of the highest order comparator means, for comparing the varied analog input voltage with the respective bias voltages of the comparator means to thereby convert the varied analog voltage into a corresponding digital signal represented by the output states of the respective comparator means.

4,987,418

FERROELECTRIC PANEL

Lester H. Kosowsky, Stamford, and Frederick Kubick, Redding, both of Conn., assignors to United Technologies Corporation, Hartford, Conn.

Filed Dec. 28, 1987, Ser. No. 138,775

Int. Cl.[5] H01Q *15/14*; H03C *7/00*

U.S. Cl. 342—6 **5 Claims**

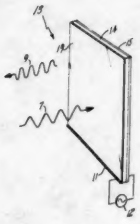
1. A device for altering a reflected return signal responsive to external illuminating RF radiation comprising;

a ferroelectric layer of material of substantially uniform composition having a first surface disposed to intercept said illuminating radiation, whereby said illuminating radiation enters said first surface of said ferroelectric layer;

means for impressing an electric field having a predetermined magnitude within said ferroelectric layer, whereby

said illuminating radiation undergoes a phase shift dependent on said magnitude of said electric field;

solid reflective means disposed in proximity to a second surface of said ferroelectric layer opposite to said first surface, for reflecting illuminating radiation emerging



therefrom back into said second surface, whereby said reflected return signal emerges from said surface in a form dependent upon said illuminating radiation but modified with respect thereto by said phase shift dependent on said electric field.

4,987,419

STABILIZING AIR TO GROUND RADAR

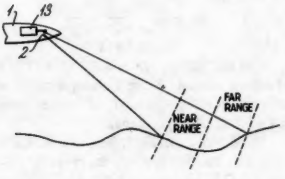
Geoffrey Salkeld, Lancashire, England, assignor to British Aerospace Public Limited Company, London, England

Continuation of Ser. No. 27,894, Mar. 19, 1987, abandoned. This application May 24, 1988, Ser. No. 198,682

Claims priority, application United Kingdom, Mar. 20, 1986, 8606978

Int. Cl.[5] G01S *13/94*

U.S. Cl. 342—75 **12 Claims**



1. A method of stabilizing the elevation of an air-to-ground radar mounted on an airborne platform, comprising the steps of:

transmitting a single radar scan from said air-to-ground radar;

first monitoring, during an initial period after said transmitting of said radar scan, a power of a first returning radar echo from said single radar scan;

second monitoring, during a following period after said initial period, a power of a later returning radar echo from said single radar scan;

comparating said power of said first returning radar echo with said power of said later returning radar echo; and

controlling the elevation of said air-to-ground radar with respect to said platform on which it is mounted in accordance with the result of said comparison between said powers of said first and later returning radar echoes from said single radar scan in a way to stabilize the angle of incidence of the radar scan on the ground.

4,987,420

METHOD OF DETERMINING A POSITION USING SATELLITES

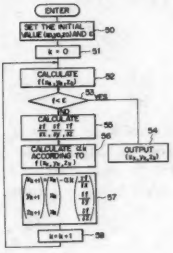
Kenichi Inamiya, Kanagawa, Japan, assignor to Mitsubishi Denki Kabushiki Kaisha, Tokyo, Japan

Filed Jan. 5, 1990, Ser. No. 461,536

Claims priority, application Japan, Jan. 11, 1989, 1-4361; Feb. 14, 1989, 1-34069; Feb. 15, 1989, 1-35381; Aug. 23, 1989, 1-216466

Int. Cl.[5] H04B *7/185*

U.S. Cl. 342—457 **20 Claims**



1. A method of determining the position of an observation point on the earth using M satellites disposed on a predetermined orbit, comprising the steps of:

(a) transmitting a reference signal at a predetermined time from a first of N satellites of the M satellites ($N<M$) to the observation point and to an adjacent subsequent N satellite, the orbit having a predetermined orbit inclination angle with respect to the equatorial plane such that the N satellites are simultaneously in the range of vision of the observation point;

(b) causing, in sequential order, the adjacent subsequent N satellite and the remaining N satellites to transmit the reference signal to the observation point and to an adjacent subsequent satellite thereto;

(c) measuring at the observation point the arrival times of the reference signals transmitted from the N satellites;

(d) calculating the orbit position of the N satellites on the basis of the arrival times obtained in said step (c) and estimated values of the orbit position of the satellites within the predetermined orbit provided by a control station on the earth; and

(e) determining at least three hyperboloids each having foci on adjacent two of the calculated orbit positions of the N satellites, whereby the position of the observation point is determined at an intersecting point of the hyperboloids.

4,987,421

MICROSTRIP ANTENNA

Yonehiko Sunahara; Makoto Matsunaga; Seiji Mano; Hiroyuki Ohmine, all of Kanagawa, and Makio Tsuchiya, Amagasaki, all of Japan, assignors to Mitsubishi Denki Kabushiki Kaisha, Tokyo, Japan

Filed Jun. 8, 1989, Ser. No. 363,050

Claims priority, application Japan, Jun. 9, 1988, 63-76709[U]; Oct. 21, 1988, 63-266961; Feb. 21, 1989, 1-40580

Int. Cl.[5] H01R *1/38*

U.S. Cl. 343—700 MS **29 Claims**

1. A microstrip antenna comprising:

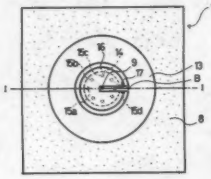
a planar dielectric body having at least two sides;

an annular radiation conductor having means defining a central opening, said radiation conductor disposed on one side of said dielectric body;

a ground conductor disposed on the other side of said dielectric body;

at least one feeder and means defining a feeding point disposed within the central opening of said annular radiation conductor;

a microwave circuit including at least conductor means for connecting said feeding point to said annular radiation conductor; and



a planar parasitic conductor facing said annular radiation conductor and means forming a dielectric layer for support of said parasitic conductor, said parasitic conductor and dielectric layer being separated from said annular radiation conductor.

4,987,422

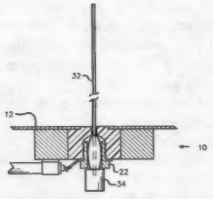
CONCEALABLE VEHICULAR RADIO COMMUNICATIONS ANTENNA SYSTEM

Kevin M. Ryan, 22056 Viscanio Rd., Woodland Hills, Calif. 91364

Filed Aug. 21, 1989, Ser. No. 396,296

Int. Cl.[5] H01Q *1/32*

U.S. Cl. 343—713 **11 Claims**



1. An antenna assembly, for vehicular radio communication, comprising;

an insulator, made in the form of a cylindrical bushing, secured to a downward facing surface of a body region of a vehicle, said insulator having (a) a through aperture disposed coaxially relative to an opening in the body region and (b) an upward facing surface, disposed within the opening, flush with an upward facing surface of the body region surrounding the opening;

a metallic collar, surrounding said insulator, adapted to secure said insulator to an inner surface of the vehicle body region;

a socket having a contact sleeve disposed coaxially within the aperture so as to form, in combination therewith, a passageway through the body region, said socket being substantially contained within the insulator and the sleeve being operationally connected to radio communication means in the vehicle; and

antenna means having enlarged plug means engaging the socket sleeve, said antenna means being made readily deployable and fully removable from within the vehicle manually without the use of tools.

4,987,423

WIDE BAND LOOP ANTENNA WITH DISYMMETRICAL FEEDING, NOTABLY ANTENNA FOR TRANSMISSION, AND ARRAY ANTENNA FORMED BY SEVERAL SUCH ANTENNAS

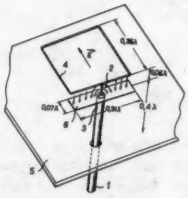
Jean Bouko, Villemoisson, Richard Piglowski, Morsang Sur Orge, both of France, assignors to Thomson-CSF, Puteaux, France

Filed Mar. 24, 1989, Ser. No. 328,447

Claims priority, application France, Apr. 1, 1988, 88 04389

Int. Cl.[5] H01Q *7/00*

U.S. Cl. 343—741 **10 Claims**



1. A loop type antenna system, fed by at least one coaxial line, having a core and a peripheral conductor, said antenna system comprising:

at least one symmetrical, plane, radiating element in the form of a closed loop with a first feed point thereon, said feed point being connected to said core of said coaxial feed line;

a planar reflector extending in plane parallel to the plane of said loop and at a distance from it; and

at least one symmetrizer element in the shape of a metallic plate, placed between said loop and said planar reflector and extending in parallel to the plane of the loop and to that of the planar reflector, with a general shape substantially corresponding to the shape of a predetermined portion of said loop comprising said feed point, said plate being connected to said peripheral conductor of said coaxial feed line.

4,987,424

FILM ANTENNA APPARATUS

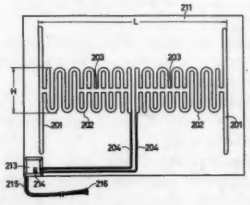
Kazuhiko Tamura; Atsushi Sato; Yutaka Aizawa, all of Oomiya, and Yoshiyuki Suzuki, Ageo, all of Japan, assignors to Yagi Antenna Co., Ltd., Tokyo, Japan

Filed Nov. 13, 1989, Ser. No. 434,573

Claims priority, application Japan, Nov. 7, 1986, 61-171032; Nov. 7, 1986, 61-171033; Nov. 7, 1986, 61-171034; Apr. 10, 1987, 62-088177; Apr. 10, 1987, 62-088178

Int. Cl.[5] H01Q *9/28*

U.S. Cl. 343—795 **2 Claims**



1. A flat antenna apparatus comprising:

a flexible insulating sheet which can be freely folded; and

a flexible antenna made or a conductive foil and formed on said insulating sheet;

said flexible antenna being a dipole antenna having two linear antenna elements extending in spaced, parallel relation to one another on one face of said sheet; a feeder portion for each of said linear antenna elements, said feeder portions extending in closely spaced, parallel relation to one another midway between said linear antenna elements; for each of said linear antenna elements, an extension coil electrically connecting said linear antenna element to the respective one of said feeder portions, each extension coil having a wave-like configuration of adjacent crests and troughs; and a linear short-circuit portion for each of said extension coils extending from the corresponding one of said feeder portions and crossing at least one section of said extension coil between adjacent crests and troughs to directly electrically connect each of said cross sections to said corresponding feeder portion, thereby achieving impedance matching of said antenna apparatus with respect to a receiving apparatus.

4,987,425

ANTENNA SUPPORT STRUCTURE

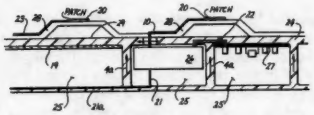
Rudolf Zahn, Markdorf; Hans W. Schroeder; Christian Borgwardt, both of Immenstaad; Albert Braig, Markdorf; Gunter Helwig, Daisendorf, and Kay Dittrich, Meersburg, all of Fed. Rep. of Germany, assignors to Dornier System GmbH, Friedrichshafen, Fed. Rep. of Germany

Filed Nov. 14, 1988, Ser. No. 271,037

Claims priority, application Fed. Rep. of Germany, Nov. 13, 1987, 3738506

Int. Cl.[5] H01Q *21/000, 1/280, 1/320, 13/080*

U.S. Cl. 343—853 **11 Claims**



8. An antenna structure comprising:

a carrier made of insulating fiber reinforced material with hollow spaces in its interior and having in the interior, a carrying surface, the hollow space including stiffening side walls provided for strengthening the carrier;

electric power circuit elements in the interior of said hollow spaces in heat conductive relation with the carrier material such that the heat developed by the circuit elements is conducted through said stiffening side walls to the said carrying surface;

a protective layer on the carrier in heat conductive relation thereto such that heat from the carrier is radiated off a front surface of the protective layer;

antenna elements mounted on said front surface of the protective layer such that heat is also conducted through said antenna elements; and

feeder lines connected to the antenna elements and embedded in the protective layer between the carrier and the antenna elements.

4,987,426

LASER IRRADIATING APPARATUS AND LASER RECORDING APPARATUS USING THE SAME

Shinichi Ota, and Keiichi Kawasaki, both of Tokyo, Japan, assignors to Canon Kabushiki Kaisha, Tokyo, Japan

Filed Sep. 7, 1989, Ser. No. 404,219

Claims priority, application Japan, Sep. 14, 1988, 63-230918

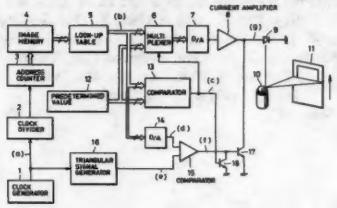
Int. Cl.[5] H04N *1/25;* **H01S** *3/10*

U.S. Cl. 346—108 **15 Claims**

1. A laser irradiating apparatus comprising:

a laser which can be directly modulated by a modulation signal, and in which laser oscillation becomes unstable when the intensity of the modulation signal is smaller than a predetermined threshold value, and laser oscillation becomes stable when the intensity of the modulation signal is larger than the predetermined threshold value:

means for comparing the intensity of said modulation signal



with a predetermined value near said predetermined threshold value; and

means for modulating an emission time of said laser when the intensity of said modulation signal is smaller than said predetermined value.

4,987,427

Patent Not Issued For This Number

4,987,428

COLOR IMAGE FORMING APPARATUS

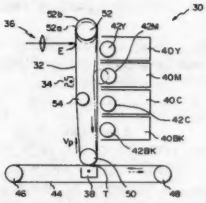
Kazunori Bannai; Yutaka Koizumi, both of Yokohama, and Mitsuru Mamizuka, Tokyo, all of Japan, assignors to Ricoh Company, Ltd., Tokyo, Japan

Filed Aug. 2, 1989, Ser. No. 388,514

Claims priority, application Japan, Aug. 25, 1988, 63-211458

Int. Cl.[5] G01D *15/06;* **G03G** *15/01*

U.S. Cl. 346—157 **6 Claims**



1. A color image recording apparatus for transferring and recording a color image representative of a document on a paper sheet, comprising:

a photoconductive element in the form of a movable belt;

optics for exposing said belt to the color image color by color at an exposure station to sequentially form electrostatic latent images which are individually associated with the colors;

developing means located at a developing station adjacent to said belt and comprising a plurality of developing units each storing a developer of different color, said plurality of developing units being selectively caused into and out of contact with said belt to develop the latent images into visible images by said developers;

transferring means for sequentially transferring the visible images of different colors one over another to the paper sheet at a transfer station; and

at least two rollers supporting and moving said belt, one of said at least two rollers comprising a drive roller fixed in place at the transfer station and the other comprising a tension roller which is located downstream of the exposure station in such a manner as to be displaceable in a predetermined direction in response to a change in configuration of said belt;

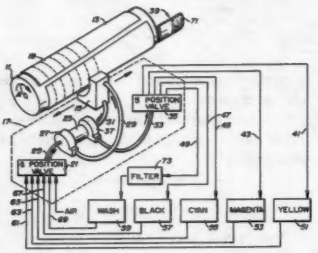
whereby a length of said belt as measured from the exposure station to the transfer station is maintained constant.

4,987,429

ONE-PUMP COLOR IMAGING SYSTEM AND METHOD

Ronald B. Finley, San Francisco; Gene F. Day, Hillsborough, and David J. Devine, San Jose, all of Calif., assignors to Precision Image Corporation, Redwood City, Calif.

Filed Jan. 4, 1990, Ser. No. 460,735
Int. Cl.[5] G01D *15/06*; G03G *25/00*
U.S. Cl. 346—157 18 Claims



1. A color system for producing an image on a surface of a recording medium comprising,

a toner applicator,

first means for delivering a toner liquid of a first color to the toner applicator,

second means for delivering a toner liquid of a second color to the toner applicator,

third means for delivering a wash liquid to the toner applicator,

fourth means for delivering a purging gas to the toner applicator,

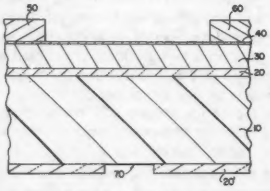
selector means in fluid communication with each of said delivery means for selectively supplying one of said liquids and gas to the toner applicator.

4,987,430

ORGANIC SEMICONDUCTOR DEVICE BASED ON PHTHALOCYANINE

Christian Clarisse, 13 Réidence de Pors-Ty-Olu, Saint-Quay Perros, 22700 Perros-Guirec; Michel Le Contellec, 43 Résidence du Roux, 22300 Lannion, and Marie-Thérése Riou, rue d'Estienne d'Orves, 22700 Perros-Guirec, all of France

Filed Nov. 8, 1988, Ser. No. 268,506
Claims priority, application France, Nov. 9, 1987, 87 15490
Int. Cl.[5] H01L *29/28*
U.S. Cl. 357—8 29 Claims



1. A semiconductor device comprising: a substrate constituted by:

a layer of semiconductor material, covered by;

a layer of dielectric material; and a coating deposited on the layer of dielectric material and constituted by:

an extrinsic molecular semiconductor constituted by a monophthalocyanine of a divalent metal or by a hydrogenated monophthalocyanine; and

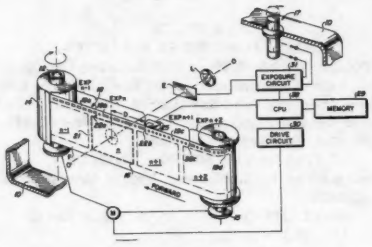
an intrinsic molecular semiconductor constituted by a phthalocyanine giving rise to free radicals.

4,987,431

FILM FRAME REGISTRATION AND CORRECTION BY MEANS OF FILM PRERECORDED TRACK

Donald M. Harvey, Webster, N.Y., assignor to Eastman Kodak Company, Rochester, N.Y.

Filed Dec. 27, 1989, Ser. No. 457,467
Int. Cl.[5] G03B *1/12*
U.S. Cl. 354—21 23 Claims



1. Apparatus for automatically metering and registering a frame of a film strip relative to an exposure station between actuations of an exposure gate in a camera, the film strip having a plurality of image frames and further having a plurality of magnetically encoded frame identifying cues including registration stopping point flags respectively correlated with said specific frames and spaced at periodic intervals along said strip, said apparatus comprising:

bidirectional drive means in said camera responsive to operation of said exposure gate for automatically transporting said film strip in a direction to advance a second frame toward said exposure station, after said film is loaded in said camera and a first frame thereof is exposed;

a magnetic read head for reading the frame specific identifying cue and stopping point flag correlated with said second frame and for stopping the transport of said film in said direction in response thereto at a point in which the film has advanced by a distance to bring said second frame into registration with said exposure station.

4,987,432

HUMAN TOPOGRAPHY THROUGH PHOTOGRAPHY

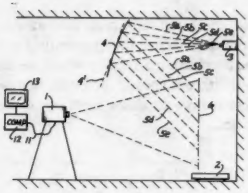
Ulrich M. Landwehr, Bahnhofstrasse 8, D-3000 Hannover, Fed. Rep. of Germany

Filed Sep. 15, 1989, Ser. No. 407,887
Claims priority, application Fed. Rep. of Germany, Sep. 17, 1989, 3831630
Int. Cl.[5] G03B *29/00*
U.S. Cl. 354—77 9 Claims

1. Apparatus for acquiring dimensions of an object by means of a photographic or video camera, particularly topographic dimensions and contour of a human body and including, a camera means positioned to take still or video picture of the object such as a person and further including means for providing, from above and in an oblique direction of projection, a pattern of horizontal raster lines, the lines to be projected onto the object such as the person as being seen by said camera means, the improvement comprising:

a projector means having a different orientation than said

oblique orientation and projecting in a diverging beam, said raster lines; and



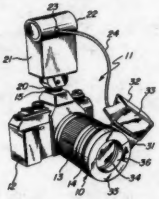
mirror means intercepting said projection beam and providing a parallel beam wherein the horizontal raster lines as projected remain equidistant to each other.

4,987,433

RING AND POINT STROBE

S. Garfield Gandrud, 414 Baywood Dr., Newport Beach, Calif. 92660

Filed Dec. 1, 1989, Ser. No. 444,420
Int. Cl.[5] G03B *15/05*
U.S. Cl. 354—132 **7 Claims**



1. For use in combination with a camera having a lens defining a lens opening and shutter means for triggering a strobe unit, a ring and point strobe comprising:

a detent housing having clamp means for attachment to a camera lens;

a ring strobe bulb supported upon said detent housing and encircling at least a portion of the lens opening;

a point source strobe bulb;

a support bracket, received upon said detent housing, supporting said point source strobe bulb; and

detent means coupled between said support bracket and said detent housing operative to detentably position said support bracket at a plurality of distinct angular positions about said ring strobe bulb.

4,987,434

CAMERA'S DATA IMPRINTING DEVICE

Isao Soshi; Osamu Sato, and Teruhiko Naruo, all of Tokyo, Japan, assignors to Asahi Kogaku Kogyo K.K., Tokyo, Japan

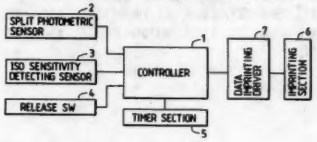
Filed Aug. 10, 1989, Ser. No. 391,829
Claims priority, application Japan, Aug. 25, 1988, 63-111435[U[; Apr. 14, 1989, 1-94714
Int. Cl.[5] G03B *17/24*
U.S. Cl. 354—106 **8 Claims**

1. A data imprinting device for a camera which imprints symbolic data on a portion of a photographing film, comprising:

a first object luminance photometric sensor for detecting a luminance level of an object in the vicinity of a symbolic data imprinting area;

light emitting means including a light source for imprinting symbolic data in a photographing film, the brightness of said light source being controllable; and

control means for controlling the brightness of said light source in said light emitting means according to the luminance of said object in the vicinity of said symbolic data imprinting area which is detected by said first object



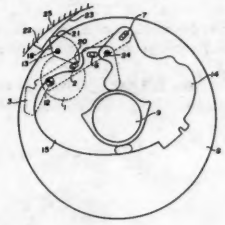
luminance photometric sensor and according to ISO data of said film, wherein said control means increases the brightness of said light source in said light emitting means when said ISO data is less than or equal to a threshold value and when the luminance of said object in the vicinity of said symbolic data imprinting area is greater than a predetermined reference value.

4,987,435

COMPACT CAMERA WITH APPARATUS SIZE ADJUSTMENT BY ZOOMING

Kiyoshi Touma, and Takashi Shimamura, both of Tokyo, Japan, assignors to Copal Company Limited, Tokyo, Japan

Filed Mar. 19, 1990, Ser. No. 495,694
Claims priority, application Japan, Mar. 29, 1989, 1-77808; Mar. 29, 1989, 1-77811
Int. Cl.[5] G03B *9/08, 13/32*
U.S. Cl. 354—195.11 **12 Claims**



1. A camera apparatus comprising: lens means operable to effect zooming to change focal distance; blade means operable during exposure to shift forwardly from its home position to open the lens means through a given shift amount effective to determine an aperture of the lens means and subsequently to shift reversely to close the lens means; driving means movable through a given reciprocating stroke for driving forwardly and reversely the blade means to effect opening and closing of the lens means; support means for supporting the blade means and the driving means; and adjusting means disposed around the support means to undergo a displacement in response to the zooming of the lens means to act on the driving means so as to control the reciprocating stroke of the driving means according to the displacement to thereby limit the shift amount of the blade means for adjusting the aperture of the lens means according to the zooming.

4,987,436

CAMERA IMAGE PLANE SIZE CONTROL DEVICE

Masayuki Misawa, Tokyo, Japan, assignor to Asahi Kogaku Kogyo Kabushiki Kaisha, Tokyo, Japan

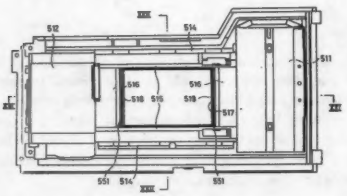
PCT No. PCT/JP87/00649, § 371 Date Mar. 30, 1988, § 102(e) Date Mar. 30, 1988, PCT Pub. No. WO88/01754, PCT Pub. Date Mar. 10, 1988

PCT Filed Sep. 1, 1987, Ser. No. 188,410

Claims priority, application Japan, Sep. 2, 1986, 61-134573[U]; Sep. 25, 1986, 61-146871[U]; Oct. 27, 1986, 61-164390[U]; Oct. 27, 1986, 61-164391[U]; Oct. 27, 1986, 61-164392[U]

Int. Cl.[5] G03B *17/02*

U.S. Cl. 354—203 53 Claims



1. Apparatus for defining the size of an image on film adapted to be positioned along a plane in a camera, said apparatus comprising a frame definig a film image aperture, said frame being positioned at a predetermined angle with respect to an optical axis of said camera, said frame comprising upper and lower rails, and first and second oppositely positioned side flanges, each of said side flanges comprising a first flange section spaced from said film, along said optical axis, by a predetermined distance, and a second flange section located directly adjacent to said aperture, said second flange section being located, along said optical axis, between said first flange section and said upper and lower rails.

4,987,437

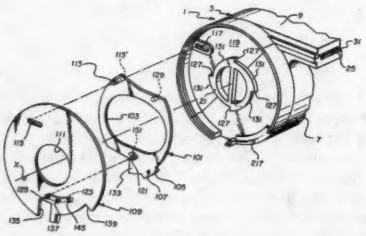
FILM CASSETTE WITH FILM EXPOSURE STATUS INDICATOR

Daniel M. Pagano, Henrietta, and Stephen H. Miller, Rochester, both of N.Y., assignors to Eastman Kodak Company, Rochester, N.Y.

Filed May 7, 1990, Ser. No. 520,309

Int. Cl.[5] G03B *17/26, 1/00, 1/04*

U.S. Cl. 354—275 7 Claims



1. A film cassette comprising a film spool supported inside a lighttight cassette shell for rotation in an unwinding direction to thrust a filmstrip coiled about said spool to the exterior of said shell, to expose said filmstrip, and in a winding direction to return exposed film to the interior of the shell, to protect the filmstrip from ambient light, and a film exposure status indicator supported for movement relative to said shell from an unexposed position for providing a visible indication that said filmstrip is unexposed to an exposed position for providing a visible indication that the filmstrip is exposed, is characterized in that:

said spool, said shell, and said status indicator include respective cooperating means for preventing rotation of the spool in the unwinding direction when the status indicator is located in its unexposed position, but which can be rendered ineffective to allow rotation of the spool in the same direction.

4,987,438

APPARATUS FOR PROCESSING LIGHT-SENSITIVE MATERIAL

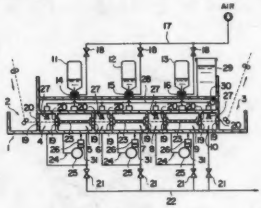
Nobutaka Goto, Kashiwa; Shigeharu Koboshi, Sagamihara; Masayuki Kurematsu, Hino, and Tomonori Kawamura, Hachioji, all of Japan, assignors to Konica Corporation, Tokyo, Japan

Filed Jun. 22, 1989, Ser. No. 370,323

Claims priority, application Japan, Jun. 27, 1988, 63-158757

Int. Cl.[5] G03D *5/04*

U.S. Cl. 354—319 14 Claims



1. A photosensitive material processing apparatus for developing a photosensitive material, the apparatus comprising:

a main body;

first conveyance means in connection with the main body for conveying the photosensitive material into the main body;

second conveyance means in connection with the main body for conveying the photosensitive material out of the main body;

developer enclosure means disposed in the main body, the developer means having a processing solution therein;

wash enclosure means connected to the developer enclosure means for preventing the processing solution from oxidizing by air or hardening by evaporation;

photosensitive material intake means in the developer enclosure means for feeding the photosensitive material into the developer enclosure means;

photosensitive material discharge means located between the developer enclosure means and the wash enclosure means for discharging the photosensitive material from the developer enclosure means into the wash enclosure means, the photosensitive material intake and discharge means isolating the developer enclosure means from outside air to maintain the developer enclosure means in a hermetic condition and prevent the developing solution from leaking from the developer enclosure means during processing; and

wash enclosure discharge means located in the wash enclosure means for discharging the photosensitive material from the wash enclosure means, the wash enclosure and photosensitive material discharge means isolating the wash enclosure means from outside air to keep the wash enclosure means in a hermetic condition.

4,987,439

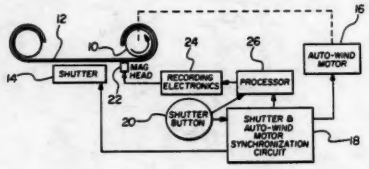
SENSING MAGNETIC RECORDING ON FILM OF SERIES SCENCE INDICATION AN USE THEREOF IN A PHOTOFINISHING SYSTEM

Robert P. Cloutier, Spencerport, N.Y., assignor to Eastman Kodak Company, Rochester, N.Y.

Filed Sep. 11, 1989, Ser. No. 405,505

Int. Cl.[5] G03B *27/52, 17/24*

U.S. Cl. 355—40 **5 Claims**



1. In a photofinishing system processing a length of film having a transparent magnetic layer therein, the photofinishing system including a film scanner which derives photosensiometric data characteristic of each frame on the film and an exposure adjustable print exposure source which exposes each successive frame on the film onto a corresponding frame on a roll of photosensitive paper, the improvement comprising:

a magnetic head positioned near said film so as to read data recorded thereon associated with successive frames thereof; and

a processor controlling said magnetic head and receiving said sensiometric data, said processor comprising means for computing print exposure values from said photosensiometric data for each of said frames and transmitting corresponding commands to said adjustable print exposure source whereby said exposure source performs the optimum exposure for each of said frames in accordance with said print exposure values, wherein said process further comprises means for determining whether said magnetic head senses a series scene code associated with a current one of said frames in said film, and in response thereto, employs the print exposure values computed for a previous one of said frames for controlling said print exposure source when exposing the current frame.

4,987,440

METHOD OF AND APPARATUS FOR POSITIONING IMAGE AREAS OF FILM

Gerhard Benker, Pullach; Wilhelm Nitsch, Munich; Bernd Payrhammer, Munich; Volker Weinert, Munich; Helmut Treiber, Munich, and Ulrich Klüter, Munich, all of Fed. Rep. of Germany, assignors to Agfa Gevaert AG, Leverkusen, Fed. Rep. of Germany

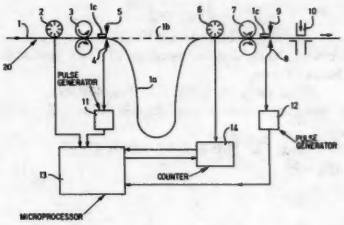
Filed Sep. 29, 1989, Ser. No. 415,066

Claims priority, application Fed. Rep. of Germany, Oct. 4, 1988, 3833731

Int. Cl.[5] G03B *27/32, 27/52*

U.S. Cl. 355—41 **32 Claims**

1. A method of positioning image areas of an exposed and developed strip of photosensitive material, comprising the steps of conveying said photosensitive material along a predetermined path; scanning said photosensitive material at a first location of said path to detect characteristic regions associated with said image areas; generating a signal in response to detection of each of said regions; establishing a first position coordinate for each of said regions upon passage of the respective region by said first location; calculating a second position coordinate for each of said image areas using said signals and said first position coordinates; storing each of said signals in correlation to the respective first position coordinate; measuring the distance of travel of said photosensitive material; and positioning each of said image areas at a second location of said path using said second position coordinates and the measured distance of travel of said photosensitive material, the positioning step including checking the measurements obtained during



the measuring step using said signals and said first position coordinates.

4,987,441

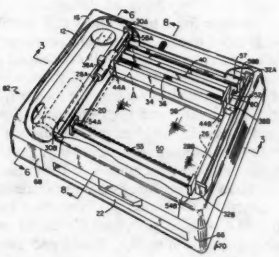
COMPACT HAND-HELD APPARATUS FOR COPYING AN ILLUMINATED IMAGE

William Hudspeth, Norwell, Mass., assignor to Polaroid Corporation, Cambridge, Mass.

Filed Jun. 6, 1988, Ser. No. 202,480

Int. Cl.[5] G03B *27/50*

U.S. Cl. 355—50 **18 Claims**



1. Compact hand-held photographic apparatus for transferring an illuminated image to a focal plane located within said apparatus, comprising:

a housing having an opening therein and having a focal plane enclosed within said housing;

means for supporting the illuminated image in a plane defined by an outer surface of a demountable projection of said housing, at said housing opening;

an array of image transferring graded-index microlenses mounted for movement between an initial position and a terminal position across said housing opening, said microlens array including a plurality of microlenses, each of which includes an image end and an object end, with said image ends having a substantially common image plane located substantially coincident with said focal plane and said object ends having a common focal plane located substantially coincident with said outer housing surface defined plane, said focal and said outer surface planes being located substantially within said apparatus;

means for forming a relatively-movable lighttight seal between said microlens array and structure forming said housing opening;

means for precluding the transmission of illuminated-image light by said microlens array when said array is positioned to either it said initial or its said terminal positions; and

means coupled to said microlens array for driving said array

across said housing opening from its said initial to its said terminal position to thereby transfer an illuminated image present at said housing opening to said focal plane.

4,987,442

WIRING DEVICE

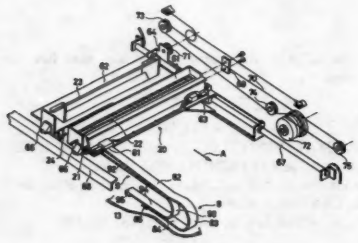
Satoshi Uemori, Nara, Japan, assignor to Mita Industrial Co., Ltd., Osaka, Japan

Filed Oct. 30, 1989, Ser. No. 429,871

Claims priority, application Japan, Nov. 8, 1988, 63-145795[U]

Int. Cl.[5] H05K *1/00*; G03B *27/50*

U.S. Cl. 355—50 **17 Claims**



1. A wiring device between a movable member and an immovable member, comprising an elongated wiring means having one of its ends fixed to said movable member and the other of its ends fixed to said immovable member, said wiring means having an intermediate generally C-shaped portion and two end portions extending from said C-shaped portion, said C-shaped portion progressively changing its position as one of said end portions elongates and the other of said end portions shortens as said movable member moves relative to said immovable member, an elongate support means having one of its ends fixed to said movable member and the other of its ends fixed to said immovable member, said support means having an intermediate generally C-shaped part and two end parts extending from said C-shaped part, said C-shaped part progressively changing its position as one of said end parts elongates and the other end part shortens as said movable part moves relative to said immovable part, one of said end portions of said wire means being generally horizontally disposed, said C-shaped part being spaced from said C-shaped portion and being disposed to underlie said horizontally disposed end portion of said wiring means to thereby support said horizontally disposed end portion as said movable member is moved relative to said immovable member.

4,987,443

METHOD AND APPARATUS FOR IMAGING PRESS PLATES

Sterling S. Sawyer, Jr., 4293 Slash Pine La., Tallahassee, Fla. 32304, and Myron A. Sawyer, P.O. Box 151, Burnt Hills, N.Y. 12027

Filed Apr. 3, 1990, Ser. No. 506,118

Int. Cl.[5] G03B *27/04*

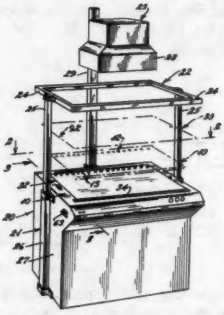
U.S. Cl. 355—85 **10 Claims**

1. A method of imaging press plates for use with the cylinders of a printing press and wherein the printing cylinders have a first slot therein for receiving the leading edge of the press plate and a second slot therein for receiving the trailing edge of the press plate and wherein the press plates are exposed while on an exposure platen having a front beveled end comprising the steps of:

(a) bending the leading edge of the press plate so as to form a bent front edge which may be cooperatively receivable within the first slot of the cyclinder;

(b) placing the press plate on the exposure platen so that said bent front edge is engaged with the front beveled end of the exposure platen;

(c) retaining the press plate so that the bent leading edge is in a first orientation against the front beveled end of the exposure platen;



(d) placing a film to be exposed to the press plate over the press plate;

(e) angularly aligning the film with respect to said first orientation of the bent front edge of the press plate;

(f) and thereafter exposing the film to the press plate.

4,987,444

METHOD AND APPARATUS FOR PREVENTING LIGHT SOURCE DEGRADATION IN AN EXPOSING APPARATUS EMPLOYING A HALOGEN LAMP

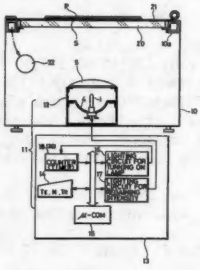
Seiji Nanri, Shiga, Japan, assignor to Dainippon Screen Mfg. Co., Ltd., Japan

Filed Oct. 31, 1989, Ser. No. 429,830

Claims priority, application Japan, Oct. 31, 1988, 63-276569; Aug. 31, 1989, 1-227139

Int. Cl.[5] G03B *27/72*

U.S. Cl. 355—69 **19 Claims**



1. An exposure apparatus, comprising:

an intermittent lighting means for intermittently turning on a halogen lamp;

means for finding an intermittent lighting accumulation value of said halogen lamp;

memory means for storing a prescribed value defining a timing for starting turning-on of the lamp to enable a halogen cycle;

means for comparing said intermittent lighting accumulation value with said prescribed value thereby to determine whether said intermittent lighting accumulation value has reached said prescribed value; and

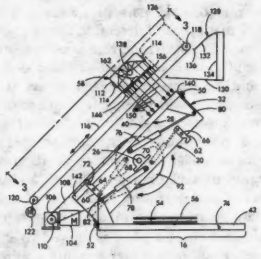
means for keeping said halogen lamp continuously on for a prescribed time period for regaining intensity determined by characteristics of said halogen lamp after said comparing means determines that said prescribed value has been reached by said intermittent lighting accumulation value.

4,987,445

SCANNING LIGHT CONTACT DUPLICATING APPARATUS

Dennis A. Burgess, Tonka Bay; William J. Campbell, Minnetonka, and Arvids Saldenais, Champlin, all of Minn., assignors to Burgess Industries Inc., Plymouth, Minn.

Filed Oct. 13, 1989, Ser. No. 421,182
Int. Cl.[5] G03B *27/10*
U.S. Cl. 355—84 **21 Claims**



1. A scanning light contact duplicating apparatus comprising, an exposure frame having a front and rear edge and a backing plate for supporting an original sheet to be copied with a photosensitive sheet in contact therewith, a transparent cover connected to the exposure frame, means for pressing the transparent cover toward the backing to force the sheets into close contact with each other, an elongated scanning light positioned parallel to the front edge of the exposure frame, the light being supported for movement toward the rear edge of the exposure frame and parallel to the plane of the exposure frame, means adjacent the light to reflect light toward the frame, a collimator between the light and the exposure frame, said collimator having a honeycomb array of parallel open-ended cells, each of the cells having walls perpendicular to the plane of the exposure frame, the collimator being supported for movement with the light whereby the alignment of light rays that pass from the light through the cells of the collimator reduce undercutting of the image produced on the photosensitive sheet and the movement of the collimator relative to the photosensitive sheet prevents the formation of shadows by the collimator.

4,987,446

PROCESS UNIT CARTRIDGE FOR AN ELECTROPHOTOGRAPHIC APPARATUS

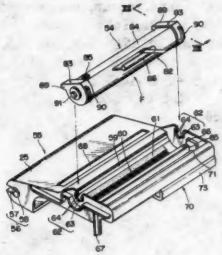
Hideaki Mochimaru; Kenya Komada; Masahiro Tomita, and Rikio Kasahara, all of Yokohama, Japan, assignors to Ricoh Company, Ltd., Tokyo, Japan

Filed Dec. 8, 1989, Ser. No. 447,818
Claims priority, application Japan, Dec. 15, 1988, 63-316746; Feb. 9, 1989, 1-30521; Sep. 13, 1989, 1-238089
Int. Cl.[5] G03G *15/00*
U.S. Cl. 355—200 **7 Claims**

1. A structure of a cartridge for use with an electrophotographic apparatus having a photoconductive element, a charger for charging a surface of said photoconductive element, a writing unit for writing an image on said charged surface of said photoconductive element to form an electrostatic latent image, a developing unit for developing said latent image to form a visible image by a developer which is discharged through an opening formed on a developer container, an image transferring unit for transferring said visible image to a paper sheet, and a cleaning unit for cleaning said surface of said photoconductive element after the image transfer, said cartridge structure comprising:

a main body accommodating at least said cleaning unit and being held in a body of said electrophotographic apparatus in such a manner as to be rotatable between a replaceable position and a set position about a fulcrum provided at a side of said main body of said cartridge where said cleaning unit is positioned; and

retaining means provided in said main body of said cartridge for movably mounting said developer container on said cartridge;



said developer container being movable between an open position at which said opening of said developer container is uncovered so that the developer is supplied from said developer container to said developing unit and a closed position at which said opening of said developer container is covered so that said developer is prevented from being discharged from said developer container;

said developer container is moved to said open position when said main body of said cartridge is held in said set position;

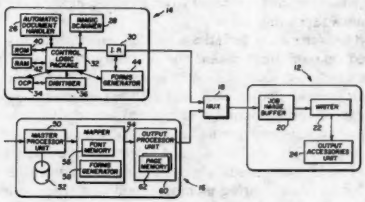
said developer container is locked in said closed position when said main body of said cartridge is held in said replaceable position while said developer container is unlocked when said main body of said cartridge is held in said set position.

4,987,447

CONTROL SHEET GENERATION FOR COPIERS AND PRINTERS

Purnendu S. Ojha, Rochester, N.Y., assignor to Eastman Kodak Company, Rochester, N.Y.

Filed Sep. 18, 1989, Ser. No. 408,828
Int. Cl.[5] G03G *15/00*
U.S. Cl. 355—204 **4 Claims**



1. Reproduction apparatus comprising:

memory means for storing setup instructions signals for said reproduction apparatus;

controller means responsive to the stored setup instruction signals for controlling operation of said reproduction apparatus;

means for generating a control sheet bearing machine readable indicia corresponding to stored setup instruction signals wherein said generating means comprises a forms generator for converting stored setup instruction signals to a bit map of machine readable indicia; and

reader means for converting the coded information on a control sheet to setup instruction signals.

4,987,448

SKEWING DETECTION MECHANISM FOR PRINTER EMPLOYING CONTINUOUS RECORDING FORM

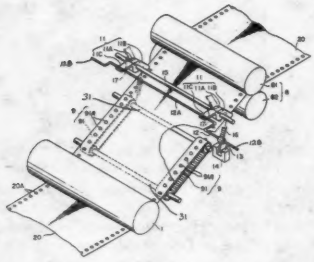
Atsushi Chikama, Tokyo, Japan, assignor to Asahi Kogaku Kogyo Kabushiki Kaisha, Tokyo, Japan

Filed Feb. 24, 1989, Ser. No. 315,120

Claims priority, application Japan, Feb. 24, 1988, 63-23587[U]; Nov. 8, 1988, 63-145706[U]

Int. Cl.[5] G03G *21/00*

U.S. Cl. 355—205 **18 Claims**



1. A skewing detection mechanism for a printer of the type wherein an image is formed on a continuous recording form, said mechanism comprising;

pivotally movable sensor means arranged in abutted and biased relation to said continuous recording form as said form is transported along a predetermined transport path;

means for detecting pivotal movement of said sensor means;

shaft means having an axis that extends perpendicularly to said predetermined transport path, said sensor means being mounted on said shaft means for pivotal movement about said axis;

spring means associated with said sensor means for biasing said sensor means in such a manner that said sensor means is abutted against said continuous recording form;

wherein said means for detecting is associated with said sensor means for detecting said pivotal movement of said sensor means about said axis of said shaft means under the biasing force of said spring means at the time that said sensor means is released from abutting against the continuous recording form;

said sensor means includes a pair of sensor elements mounted on said shaft means for pivotally moving about said axis of said shaft means in spaced relation to each other along said shaft means, and said spring means includes a pair of spring members associated, respectively, with said pair of sensor elements, said pair of sensor elements being respectively abutted against opposite side edge portions of said continuous recording form under the biasing forces of said spring members such that when at least one of said pair of sensor elements is released from abutting against a corresponding one of said opposite side edge portions of said continuous recording form and is pivotally moved about said axis of said shaft means under the biasing force of a corresponding one of said spring members, said detecting means detect said pivotal movement of said sensor element to output a signal that is representative of the occurrence of a transport abnormality of said continuous recording form;

each of said pair of sensor elements includes a boss mounted on said shaft means and a first arm that extends from said boss, said first arm having a free end face, a part of said end face being abutted against a corresponding one of said opposite side edge portions of said continuous recording form under the biasing force of a corresponding one of said pair of spring members, while a remaining part of said free end face extends outwardly from a side edge of said corresponding side edge portion of the continuous recording form;

said means for detecting includes a movable element and a detector for detecting movement of said moveable element and means for transmitting said pivotal movement of at least one of said pair of sensor elements to said moveable element of said detecting means, wherein pivotal movement of said at least one sensor element is transmitted to said moveable element of said detecting means through said transmission means so as to move said moveable element; said moveable element of said detecting means comprises a shutter plate, and said detector comprises a photointerrupter, said shutter plate being moveable between an inoperative position within a detecting region of said photointerrupter and an operative position out of said detecting region thereof, wherein said shutter plate is normally in said inoperative position, while when said shutter plate is moved to said operative position, said photointerrupter outputs a signal indicative of the occurrence of an abnormality in transporting said continuous recording form; and

wherein in each sensor element further includes a second arm projecting from said boss of said sensor element in a direction that is substantially opposite to that in which said first arm of said sensor element extends from said boss, said transmission means including a crank bar comprising opposite axial end portions having their common axis extending perpendicularly to said predetermined transport path and an eccentric shaft section extending between said opposite axial end portions, said shutter plate being mounted on one of said opposite axial end portions of said crank bar for pivotally moving about said common axis, said eccentric shaft section resting upon said second arms of respective sensor elements, wherein said pivotal movement of at least one of said pair of sensor elements causes said second arms to move said crank bar angularly about said common axis, thereby angularly moving said shutter plate from said inoperative position to said operative position.

4,987,449

METHOD OF SENSING A REMAINING AMOUNT OF DEVELOPER FOR A COLOR IMAGE FORMING APPARATUS

Shunji Katoh, Sagamihara, Japan, assignor to Ricoh Company, Ltd., Tokyo, Japan

Filed Dec. 4, 1989, Ser. No. 444,858

Claims priority, application Japan, Dec. 5, 1988, 63-306064

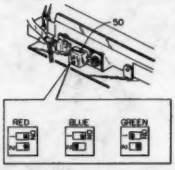
Int. Cl.[5] G03G *21/00*

U.S. Cl. 355—206 **7 Claims**

1. In an image forming apparatus operable with a plurality of replaceable developing units each storing a developer of different color for forming a plurality of color images, a method of sensing a remaining amount of developer in each of said developing units, comprising the steps of:

(a) mounting one of said developing units on said image forming apparatus;

(b) identifying a color of the developer stored in said one developing unit; and



(c) sensing a remaining amount of said developer under a sensing condition particular to a consumption rate of said identified color of said developer.

4,987,450

ELECTROPHOTOGRAPHIC PRINTER COMPRISING ALIGNED PLURAL LIGHT EMITTING DEVICES

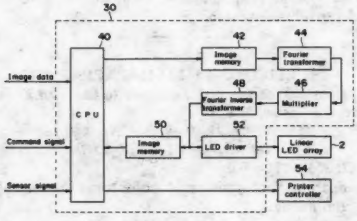
Osamu Yamada, and Masayuki Mino, both of Osaka, Japan, assignors to Minolta Camera Kabushiki Kaisha, Osaka, Japan

Filed Mar. 14, 1990, Ser. No. 493,449

Claims priority, application Japan, Mar. 15, 1989, 1-63297

Int. Cl.[5] G03G *15/04*

U.S. Cl. 355—228 **11 Claims**



1. An electrophotographic printer for projecting light emitted according to image data onto a photoconductive body performing a mechanical scan operation in a subscan direction so as to form an image of said image data on said photoconductive body, and for printing said image on a piece of printing paper using the electrophotographic process, comprising:

light emitting means comprising plural light emitting devices aligned in a main scan direction perpendicular to the subscan direction, each light emitting device having a light output opening elongated in the subscan direction;

storage means for storing first image data having been received from an external unit;

means for reading out said first image data from said storage means;

means for Fourier transforming said image data read out from said storage means into second image data;

means for multiplying said second image data by a predetermined frequency characteristic defined by the shape of each of said light output openings, thereby generating third image data;

means for Fourier inverse transforming said third image data into fourth image data; and

means for controlling said light emitting means based on said fourth image data.

4,987,451

IMAGE FORMING APPARATUS

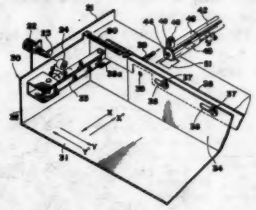
Akihiro Hikosaka; Hitoshi Sakai; Takayoshi Yoshihara, and Naoichi Asakura, all of Osaka, Japan, assignors to Minolta Camera Kabushiki Kaisha, Osaka, Japan

Filed Jan. 26, 1990, Ser. No. 470,677

Claims priority, application Japan, Jan. 30, 1989, 1-21702

Int. Cl.[5] G03G *15/06, 15/00*

U.S. Cl. 355—245 **11 Claims**



1. An image forming apparatus comprising:

a unit attachable to the body of the image forming apparatus and including image forming means, said unit having at least a developing device which has a toner receiving opening;

toner supply means for supplying toner to said developing device through a toner supply opening thereof, said toner supply opening being opposed to said toner receiving opening at a predetermined position when said unit is attached to the body of the image forming apparatus;

a covering member for selectively covering the toner supply opening;

fastening means for fastening said unit on the body of the image forming apparatus; and

moving means disposed in the body of the image forming apparatus for moving said covering member so that the toner receiving opening is open when said unit is fastened on the body of the image forming apparatus by said fastening means.

4,987,452

DEVELOPING APPARATUS PROVIDED WITH A CHAMBER FOR CONTROLLING TONER GRAIN DIAMETER

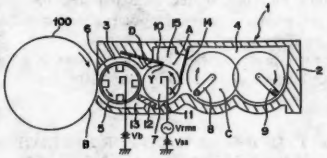
Shuichi Nakagawa; Hiroshi Murasaki; Akihito Ikegawa; Kouichi Etou, and Hiroshi Mizuno, all of Osaka, Japan, assignors to Minolta Camera Kabushiki Kaisha, Osaka, Japan

Filed Dec. 28, 1988, Ser. No. 291,120

Claims priority, application Japan, Dec. 29, 1987, 62-334026; Dec. 29, 1987, 62-334027; Dec. 29, 1987, 62-334028

Int. Cl.[5] G03G *15/06, 15/09*

U.S. Cl. 355—245 **23 Claims**



1. An electrostatic latent image developing apparatus which comprises:

an agitating member accommodated in a casing,

a roller member accommodated in a front of the casing, and

a blade contacting under pressure with an outer circumferential portion of said roller member, which is arranged in the casing, toner held on the outer circumferential portion of said roller member being supplied to develop an electrostatic latent image on the basis of rotation of said roller member while being regulated by said blade,

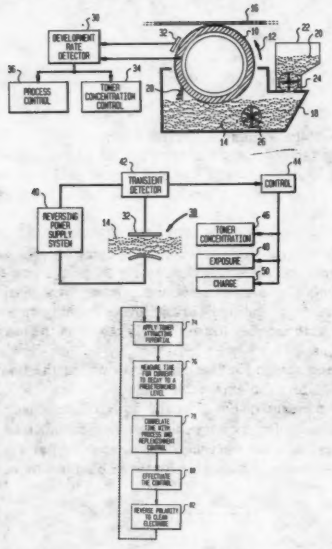
said apparatus comprising a partition member arranged between said roller member and said agitating member at an upper stream side of said blade corresponding to a rotary direction of said roller member, the casing having a space defined among said partition member, said blade, and the outer circumferential portion of said roller member.

4,987,453

DEVELOPMENT RATE CONTROLLER

Joseph F. Laukaitis, Rochester, N.Y., assignor to Eastman Kodak Company, Rochester, N.Y.

Filed Feb. 1, 1990, Ser. No. 473,530
Int. Cl.[5] G03G *15/09*
U.S. Cl. 355—246 **16 Claims**



1. Apparatus for controlling the development rate of an electrostatographic device using a powder toner, said apparatus comprising:

an electrode capacitively coupled to another member and suitably positioned to interact with toner used in the device;

means for applying potentials to the electrode and the other member;

means for charging the polarity of the potential applied to the electrode;

means for determining the time required for a charging current, produced when the polarity is changed, to decay to a predetermined value; and

means for converting the determined time into signals for controlling the development rate of the device.

4,987,454

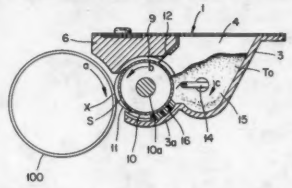
DEVELOPING METHOD FOR DEVELOPING ELECTROSTATIC LATENT IMAGE

Toshiya Natsuhara; Yuji Enoguchi; Hiroshi Mizuno; Masahiro Anno, and Junji Machida, all of Osaka, Japan, assignors to Minolta Camera Kabushiki Kaisha, Osaka, Japan

Filed Jun. 16, 1989, Ser. No. 367,121
Claims priority, application Japan, Jun. 17, 1988, 63-150801
Int. Cl.[5] G03G *15/06*
U.S. Cl. 355—259 **19 Claims**

1. A method for developing an electrostatic latent image comprising the steps of;

(a) supplying toner onto a toner transporting member which confronts an electrostatic latent image support member with the electrostatic latent image thereon at a developing region, said toner being 12 μm or less in mean particle size,



10% or less of toner having at least 16 μm in particle size, and 20% or less in coefficient of variation, said coefficient of variation being defined as:

$$\text{Coefficient of variation } (\%) = (\rho/X) \times 100$$

wherein a standard deviation value (ρ) is represented by a following formula:

$$\sigma = \sqrt{\frac{(X_1 - X)^2 + (X_2 - X)^2 + (Xn - X)^2}{N - 1}}$$

$$\approx \sqrt{\frac{1}{n-1}\left[\Sigma Xi^2 - \frac{(\Sigma Xi)^2}{n}\right]}$$

wherein X_1, X_2, Xn represent respective particle sizes of sample particles, and X represents a mean value of n particle sizes;

(b) forming a thin layer of said toner on the toner transporting member by pressing said toner; and

(c) transferring said toner from said thin layer of said toner onto the electrostatic latent image formed on said electrostatic latent image support member for developing the electrostatic latent image.

4,987,455

MULTICOLOR IMAGING APPARATUS

Cor Lubberts, Webster, N.Y., assignor to Eastman Kodak Company, Rochester, N.Y.

Filed Nov. 22, 1989, Ser. No. 440,163
Int. Cl.[5] G03G *15/14, 15/01*
U.S. Cl. 355—271 **5 Claims**

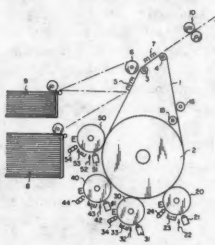
1. Apparatus for forming multicolor toner images, said apparatus comprising:

a transfer web supported by a large diameter drum and at least on smaller diameter roller for movement through an endless path,

a plurality of imaging members positioned in transfer relation to said transfer web at positions along said path at which said web is supported by said drum,

means for forming toner images of different colors on said imaging members,

means for transferring said toner images from said imaging



members to said transfer web in registration to form a multicolor image, and

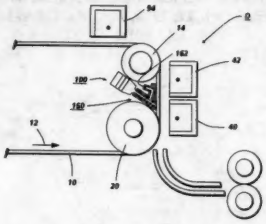
means for transferring said multicolor image from said transfer web to a receiving sheet.

4,987,456

VACUUM COUPLING ARRANGEMENT FOR APPLYING VIBRATORY MOTION TO A FLEXIBLE PLANAR MEMBER

Christopher Snelling, Penfield, and Dale R. Mashtare, Macedon, both of N.Y., assignors to Xerox Corporation, Stamford, Conn.

Filed Jul. 2, 1990, Ser. No. 548,350
Int. Cl.[5] G03G *15/14*
U.S. Cl. 355—273 **21 Claims**



1. In an imaging device having a non-rigid member with a charge retentive surface, moving along an endless path, means for creating a latent image on the charge retentive surface, means for imagewise developing the latent image with toner, means for electrostatically transferring the developed toner image to a copy sheet in contact with said charge retentive surface, and means for enhancing transfer of said developed image to said copy sheet, said transfer enhancing means including:

a resonator, producing relatively high frequency vibratory energy, and having a portion thereof adapted for contact across the non-rigid member, generally transverse to the direction of movement thereof;

a vacuum source;

a vacuum box, substantially enclosing said resonator portion, having an opening adjacent the non-rigid member through which said resonator portion may contact the non-rigid member, upstream and downstream enclosure walls adapted for contact across the non-rigid member generally transverse to the direction of movement thereof, and an outlet port for connecting said vacuum box to said vacuum source;

said upstream and downstream enclosure walls and said resonator portion extending to approximately a common plane;

said vacuum source providing sufficient force at said vacuum box opening to draw the non-rigid member into engagement with said upstream and downstream enclosure walls and said resonator portion; and

means for driving the resonator to produce relatively high frequency vibratory energy.

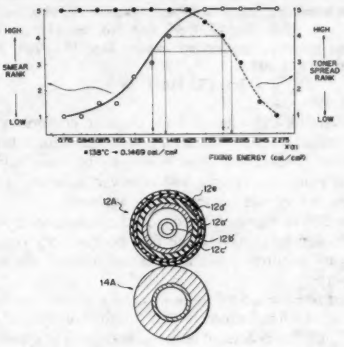
4,987,457

FIXING METHOD FOR A WET PROCESS COPIER

Manabu Mochizuki, Yokohama; Tsuneo Kurotori; Ichiro Tsuruoka, both of Tokyo; Katsuhiro Echigo, Yokohama; Hiroaki Takenouchi, and Setsuo Soga, both of Tokyo, all of Japan, assignors to Ricoh Company, Ltd., Tokyo, Japan

Filed Jan. 3, 1990, Ser. No. 460,628
Claims priority, application Japan, Jan. 12, 1989, 1-5509; Feb. 8, 1989, 1-29239; Feb. 8, 1989, 1-29240; Nov. 29, 1989, 1-309738
Int. Cl.[5] G03G *15/20*
U.S. Cl. 355—285 **5 Claims**

1. In a fixing method for a wet process copier which develops an electrostatic latent image by using a heat-bridging type toner to produce a toner image, transfers said toner image to a paper sheet, and fixes said toner image transferred to said paper sheet by transporting said paper sheet through a nipping section defined by a heating roller and a pressing roller such that one side of said paper sheet carrying said toner image directly



contacts said heating roller, the improvement wherein fixing energy Q (cal/cm^2) for fixing said toner image lies in a predetermined range expressed as:

$$Q = KT\sqrt{\frac{l}{V}}$$

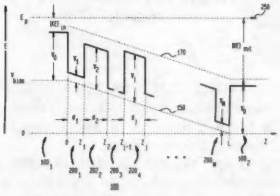
where K is a constant, T is a temperature T (°C.) of said heating roller, l is a width (mm) of said nipping width, and V is a linar velocity (mm/sec).

4,987,458

SEMICONDUCTOR BIASED SUPERLATTICE TUNABLE INTERFERENCE FILTER/EMITTER

Thomas K. Gaylord; Kevin F. Brennan, and Elias N. Glytsis, all of Atlanta, Ga., assignors to Georgia Tech Research Corporation, Atlanta, Ga.

Filed Jun. 30, 1989, Ser. No. 374,476
Int. Cl.[5] H01L *27/12*
U.S. Cl. 357—4 **12 Claims**



1. A solid state, quantum mechanical, electron wave filter/emitter which comprises:

a superlattice structure which is comprised of a multiplicity of adjacent layers of semiconductor material, each of which layers has a pontential energy barrier and supports substantially ballistic electron transport at energies above the potential energy barrier of the layer and

means for applying a bias potential energy to the superlattice structure wherein the potential energy barriers, electron effective masses, and thicknesses of the layers of the superlattice structure are predetermined as if a predetermined bias potential has been applied to the applying means so that the application of the predetermined bias potential to the applying means causes the filter/emitter to function as a filter/emitter for electrons having kinetic energies in a predetermined range.

4,987,459

VARIABLE CAPACITANCE DIODE ELEMENT HAVING WIDE CAPACITANCE VARIATION RANGE

Takeshi Kasahara, Saitama, Japan, assignor to Toko, Inc., Japan

Filed Jan. 17, 1990, Ser. No. 466,244

Claims priority, application Japan, Jan. 19, 1989, 1-10886; Jan. 30, 1989, 1-20496

Int. Cl.[5] H01L *29/92*

U.S. Cl. 357—14 5 Claims

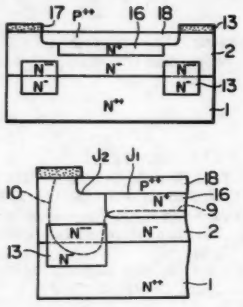
1. A variable-capacitance diode element, comprising:

an epitaxial layer provided on a semiconductor substrate of a first conductivity type, said epitaxial layer having the first conductivity type and relatively a lower resistivity than that of said semiconductor substrate;

a first diffusion layer formed in said epitaxial layer, said first diffusion layer having the first conductivity type and a higher impurity concentration than that of said epitaxial layer;

at least one second diffusion layer of a second conductivity type which is formed in said first diffusion layer so that PN junction is defined between said first and second diffusion layers; and

a buried layer formed in boundary portion between said semiconductor substrate and said epitaxial layer where a depletion layer which occurs due to a reverse bias voltage being applied to said PN junction reaches, said buried



layer having the first conductivity and a lower resistivity than that of said semiconductor substrate.

4,987,460

LIGHT EMITTING DEVICE

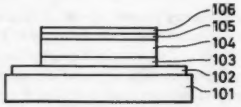
Katsuji Takasu; Masafumi Sano; Hisanori Tsuda, all of Atsugi, and Yutaka Hirai, Tokyo, all of Japan, assignors to Canon Kabushiki Kaisha, Tokyo, Japan

Continuation of Ser. No. 298,316, Jan. 17, 1989, abandoned, which is a continuation of Ser. No. 900,713, Aug. 27, 1986, abandoned. This application Sep. 13, 1989, Ser. No. 406,815

Claims priority, application Japan, Aug. 29, 1985, 60-190455; Aug. 30, 1985, 60-191423; Sep. 4, 1985, 60-196192; Sep. 4, 1985, 60-196193; Sep. 6, 1985, 60-198299; Sep. 21, 1985, 60-209339; Sep. 22, 1985, 60-209633

Int. Cl.[5] H01L *33/00*

U.S. Cl. 357—17 25 Claims



1. A light emitting device comprising: (a) a luminescent layer having at least two layers laminated to each other; (i) each layer comprising a non-single crystalline material containing silicon atoms, carbon atoms and fluorine atoms (ii) having a homo-junction at the interface of said layers and (iii) having a quantum efficiency of 10^{-4}% or more, and (b) at least a pair of electrodes connected electrically to said luminescent layer, and each of said non-single crystalline silicon layers having an optical band gap of at least 2.0 eV and a localized level density at mid-gap of no more than 5×10^{16} $cm^{-3}.eV^{-1}$.

4,987,461

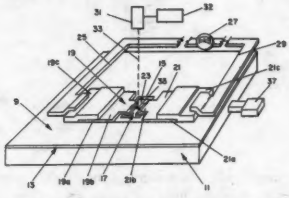
HIGH POSITION RESOLUTION SENSOR WITH RECTIFYING CONTACTS

Steven R. J. Brueck; Soares, Schubert; Kristin McArdle, and Bill W. Mullins, all of Albuquerque, N. Mex., assignors to The University of New Mexico, Albuquerque, N. Mex.

Filed Oct. 11, 1989, Ser. No. 419,811

Int. Cl.[5] H01L *31/12*

U.S. Cl. 357—19 24 Claims



1. A semiconductor position sensor capable of detecting changes of position in the movement of a member comprising:

a. radiation beam-producing source means coupled to the member to move in correspondence therewith;

b. means including a semiconductor body, said body having one surface exposed to said beam, said beam thereby terminating in an irradiated spot on said surface;

c. a plurality of contact means each having a portion contacting said one surface at a location spaced apart from the location of the other portions of said means to provide rectifying contact barriers with a gap therebetween, there being a short circuit photocurrent at a level when the spot is at a predetermined null position in said gap, the photocurrent being at other, different levels when the spot occupies other, different positions in said gap, and

d. readout means coupled to said plurality of contact means to provide an indication of the extent of displacement of the member when, due to movement of the member and thus the beam, the spot is displaced from its previous position.

4,987,462

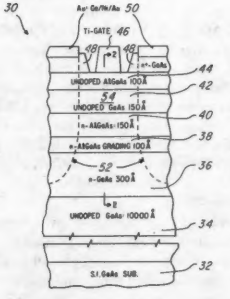
POWER MISFET

Bumman Kim, Richardson, and Hua Q. Tserng, Dallas, both of Tex., assignors to Texas Instruments Incorporated, Dallas, Tex.

Filed Jan. 6, 1987, Ser. No. 706

Int. Cl.[5] H01L *29/80, 29/161*

U.S. Cl. 357—22 9 Claims



1. A field effect transistor, comprising:

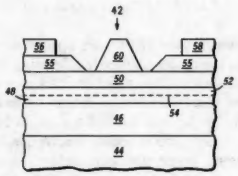
(a) a channel made of a first semiconductor material, said channel undoped or lightly doped;
(b) a gate insulator made of a second semiconductor material said insulator on said channel, said second material of wider bandgap than said first material and lattice matched or strained layer matched to said first material, and said insulator undoped or lightly doped;
(c) a gate on said insulator, said gate separated from said channel by said insulator;
(d) a barrier made of a third semiconductor material, said barrier on said channel and separated from said insulator by said channel, said third material of wider bandgap than said first material and lattice matched or strained layer matched to said first material, and said barrier at least partially heavily doped; and
(e) source and drain regions contacting said channel.

4,987,463

FET HAVING A HIGH TRAP CONCENTRATION INTERFACE LAYER

Herbert Goronkin, and Saied N. Tehrani, both of Scottsdale, Ariz., assignors to Motorola, Inc., Schaumburg, Ill.

Filed Aug. 28, 1989, Ser. No. 399,099
Int. Cl.[5] H01L *29/80*
U.S. Cl. 357—022 **11 Claims**



1. A FET having a trap concentrated interface region comprising:
a semi-insulating substrate;
a trap concentrated interface region having an electrically inactive impurity therein, said region disposed in said substrate;
a non-intentionally doped semiconductor buffer layer formed on said trap concentrated interface region of said substrate;
a semiconductor layer formed on said buffer layer; and
source, gate and drain contacts formed on the FET.

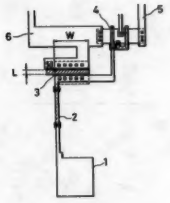
4,987,464

ENCAPSULATED FET SEMICONDUCTOR DEVICE WITH LARGE W/L RATIO

Yasuhiro Fukuda, and Shooji Kitazawa, both of Tokyo, Japan, assignors to Oki Electric Industry Co., Ltd., Tokyo, Japan

Filed Feb. 2, 1990, Ser. No. 473,740
Claims priority, application Japan, Jan. 23, 1987, 62-12290
Int. Cl.[5] H01L *29/78*
U.S. Cl. 357—23.800 **6 Claims**

1. A semiconductor device comprising:
an external input terminal;
a package formed of an insulating material;
a semiconductor substrate, and internal circuit components formed on said semiconductor substrate, said semiconductor substrate being encapsulated by said package, said internal circuit components including:
a first insulated-gate field-effect transistor having a gate oxide which has a predetermined thickness, a protection resistor connecting the gate of said first insulated-gate field-effect transistor to said external input terminal, a second insulated-gate field-effect transistor having a channel formed in said semiconductor substrate, a drain connected directly to the gate of said first insulated-gate field-effect transistor, a gate, and a source, said gate and said source each being connected to ground potential, and said first insulated-gate field-effect transistor having a channel which is formed in said semiconductor substrate;



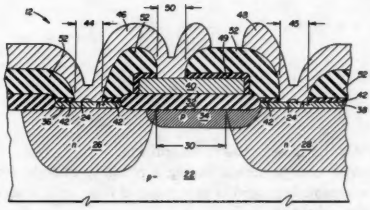
wherein said channel of said second insulated-gate field-effect transistor has a channel width and a channel length, and the ratio of said channel width to said channel length is not less than 12.

4,987,465

ELECTRO-STATIC DISCHARGE PROTECTION DEVICE FOR CMOS INTEGRATED CIRCUIT INPUTS

Steven W. Longcor, Mountain View, Calif.; Kuang-Yeh Chang, Austin, Tex.; Jih-Chang Lien, San Jose, and David M. Rogers, Sunnyvale, both of Calif., assignors to Advanced Micro Devices, Inc., Sunnyvale, Calif.

Continuation of Ser. No. 8,703, Jan. 29, 1987, abandoned, which is a continuation-in-part of Ser. No. 761,223, Jul. 31, 1985. This application Oct. 28, 1988, Ser. No. 266,223
Int. Cl.[5] H01L *29/78*
U.S. Cl. 357—23.13 **11 Claims**



1. An ESD protection device for an integrated circuit provided in a substrate having an input pad, comprising:
n-well to n^+ clamping means, including a first input node coupled to the input pad and a first output node coupled to ground potential of the integrated circuit, for sinking to ground at least a first portion of an input current associated with an electro-static voltage discharge to the input pad and for clamping said first input node at a first clamp voltage which is less than the electro-static discharge voltage, comprising:
an first n-well, having a depth and a doping concentration, provided in the substrate,
an n^+ region, having a larger doping concentration and a shallower depth than said first n-well, said n^+ region being provided in the substrate and spaced apart from said first n-well to define a channel therebetween and contacting said channel, and
a second n-well having a smaller doping concentration than said n^+ region said second n-well being provided in said substrate under said n^+ region;
second clamping means, having a second input node, for sink-

ing to ground a second portion of the input current and for clamping said second input node at a voltage which is less than the first clamp voltage; and

limiting means for coupling said first input node to said second input node and for limiting the flow of current from said first input node to said second input node.

4,987,466

SOLID STATE IMAGE SENSOR

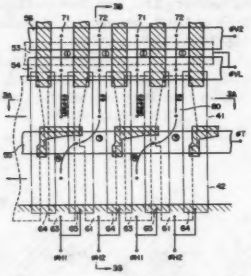
Hidenori Shibata, Yokohama; Mamoru Iesaka, Kawasaki, and Shinji Ooswa, Inagi, all of Japan, assignors to Kabushiki Kaisha Toshiba, Kawasaki, Japan

Filed Jun. 7, 1989, Ser. No. 362,664

Claims priority, application Japan, Jun. 7, 1988, 63-139947; Aug. 23, 1988, 63-208610

Int. Cl.[5] H01L *29/78, 27/14, 31/00*; G11C *19/28*

U.S. Cl. 357—24 24 Claims



1. A solid image sensor, comprising:

charge storage means having a plurality of light receiving elements arranged in columns and rows on a semiconductor substrate;

a plurality of vertical charge transfer means arranged in parallel in a column direction along the columns of said light receiving elements of said charge storage means, for vertically transferring signal charges supplied from said charge storage means; and

horizontal charge transfer means, for receiving signal charges supplied from said vertical charge transfer means and transferring the signal charges in a horizontal direction;

wherein at least one of said horizontal and vertical charge transfer means has a charge input port, a charge output port and a channel region in which a potential is higher on the charge output port side than on the charge input port side so that all signal charge is transferred across the channel to said output port; and

wherein said horizontal charge transfer means includes a plurality of horizontal registers which are arranged in parallel in a horizontal direction and respectively have channel regions through which the signal charges pass, said channel regions including first conductivity type impurity in the charge input port and second conductivity type impurity in the output port.

4,987,467

INTEGRATABLE HALL ELEMENT

Radivoje Popovic, Zug, Switzerland, assignor to LGZ Landis & Gyr Zug AG, Zug, Switzerland

Continuation of Ser. No. 946,149, Dec. 19, 1986, Pat. No. 4,782,375, which is a continuation of Ser. No. 675,717, Nov. 28, 1984, abandoned. This application Sep. 30, 1988, Ser. No. 252,781

Claims priority, application Switzerland, Dec. 19, 1983, 6739/83

The portion of the term of this patent subsequent to Nov. 1, 2005, has been disclaimed.

Int. Cl.[5] H01L *43/06*

U.S. Cl. 357—27 23 Claims

1. An integratable Hall element comprising:

a semiconductor layer having a major surface and having a thickness;

first and second sensor electrodes spaced apart from each other and at the major surface for deriving an electric Hall voltage between said first and second sensor electrodes;

a first current electrode at the major surface and located substantially at the midpoint of a straight line connecting said first and said second sensor electrodes, the part of said semiconductor layer disposed below said first current electrode and said first and second sensor electrodes forming an active portion of said Hall element;

a plurality of additional current electrodes spaced away from said first current electrode, wherein said additional current electrodes are disposed approximately symmetrically about an axis which passes through said first current electrode at approximately a right angle to said major surface, and wherein at least some of said additional current electrodes are each defined by at least one relatively large electrically conducting surface portion symmetrically disposed about said axis;

at least one electrically insulated connecting contact disposed on said major surface exteriorly of said active portion; and

at least one electric ohmic conducting connection;

the thickness of said semiconductor layer being greater than the distance between said first and second sensor electrodes for enabling electrical currents to flow between said first current electrode and said additional current electrode along paths extending deeply into said semiconductor layer so that sufficient portions of the paths of the electrical currents are substantially perpendicular to the major surface below said first current electrode to provide said Hall element with sensitivity to a magnetic field component substantially parallel to the major surface;

said relatively large electrically conducting surface portion being a buried layer disposed substantially parallel to said major surface in said semiconductor layer below said active portion of said Hall element, said one electric ohmic conducting connection connecting said connecting contact with said buried layer;

said semiconductor layer being of a first conductivity type; and

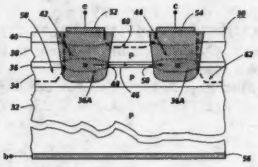
said buried layer and said conducting connection being comprised of a strongly doped semiconductor material which is of the same conductivity type as said semiconductor layer.

4,987,468

LATERAL HETEROJUNCTION BIPOLAR TRANSISTOR (LHBT) AND SUITABILITY THEREOF AS A HETERO TRANSVERSE JUNCTION (HTJ) LASER

Robert L. Thornton, East Palo Alto, Calif., assignor to Xerox Corporation, Stamford, Conn.

Filed Jun. 17, 1988, Ser. No. 208,950
Int. Cl.[5] H01L 29/72
U.S. Cl. 357—34 20 Claims



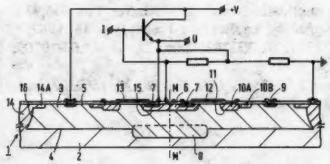
1. A heterojunction bipolar transistor comprising a plurality of semiconductor layers formed on a support, one of said layers having a narrower bandgap than immediately adjacent layers thereto, an impurity induced disordered region formed in a portion of said adjacent and narrow bandgap layers, a second region formed in another portion of said adjacent and narrow bandgap layers in laterally spaced relation to said impurity induced disordered region, said disordered region of a wider bandgap than said narrow bandgap layer and forming a heterojunction between said disordered region and a portion of said narrow bandgap layer remaining between said regions, said disordered region comprising the emitter of said transistor doped a first conductivity type, said second region comprising a collector doped said first conductivity type, said narrow bandgap layer undisordered portion between said regions comprising the base of said transistor doped a second conductivity type.

4,987,469

LATERAL HIGH-VOLTAGE TRANSISTOR SUITABLE FOR USE IN EMITTER FOLLOWERS

Adrianus W. Ludikhuize, Eindhoven, Netherlands, assignor to U.S. Philips Corp., New York, N.Y.

Filed Oct. 25, 1988, Ser. No. 262,561
Claims priority, application Netherlands, Nov. 9, 1987, 8702671
Int. Cl.[5] H01L 29/72
U.S. Cl. 357—35 6 Claims



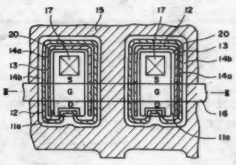
1. A semiconductor device having a semiconductor body comprising a substrate region of a first conductivity type, a semiconductor layer of the second opposite conductivity type disposed thereon and forming a pn junction with the substrate region, and a bipolar transistor having a surface-adjoining base zone of the first conductivity type, an emitter zone of the second conductivity type provided in the base zone, a highly doped buried layer of the second conductivity type located between the substrate region and the semiconductor layer, a surface-adjoining collector contact zone of the second conductivity type and a gate electrode which is located between the base zone and the collector contact zone, is separated by a barrier layer from the semiconductor layer, is spaced apart from the base zone, and is electrically connected to the emitter zone, said buried layer extending laterally beneath said base zone but not extending laterally to beneath said gate electrode or said collector contact zone.

4,987,470

SEMICONDUCTOR DRAM DEVICE HAVING A TRENCH

Takaaki Suzuki, Kawasaki, and Hiroshi Gotou, Niiza, both of Japan, assignors to Fujitsu Limited, Kawasaki, Japan

Filed Jan. 17, 1989, Ser. No. 297,470
Claims priority, application Japan, Jan. 21, 1988, 63-9457; Jun. 2, 1988, 63-134404
Int. Cl.[5] H01L 27/12, 29/68, 27/01, 27/02
U.S. Cl. 357—049 14 Claims



1. A semiconductor device having a trench comprising:
a semiconductor substrate having a trench and a transistor region surrounded by said trench, said transistor region comprising source and drain regions and a channel region above which a gate electrode is formed;
a first insulation film surrounding sidewalls of said trench;
a shield layer formed along sidewalls of said first insulation film and located under at least said gate electrode, said shield layer comprising a conductive material; and
a memory cell capacitor having first and second electrodes and a second insulation film interposed between said first and second electrodes formed in said trench, said first electrode being electrically connected to said drain region.

4,987,471

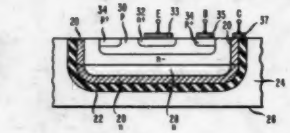
HIGH-SPEED DIELECTRICALLY ISOLATED DEVICES UTILIZING BURIED SILICIDE REGIONS

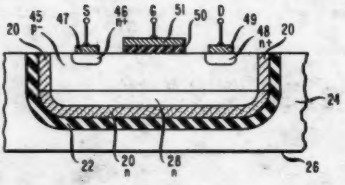
William G. Easter, and Anatoly Feygenson, both of Reading, Pa., assignors to AT&T Bell Laboratories, Murray Hill, N.J.

Continuation of Ser. No. 320,444, Mar. 7, 1989, abandoned, which is a division of Ser. No. 175,016, Mar. 30, 1988, Pat. No. 4,839,309. This application May 21, 1990, Ser. No. 528,273
Int. Cl.[5] H01L 27/12, 29/80, 29/72
U.S. Cl. 357—49 12 Claims

1. A semiconductor device formed within a dielectrically isolated tub region of a silicon substrate, said tub region having sidewalls and a bottom surface said device comprising
a silicide layer formed within said tub at the isolation boundary thereof, selected portions of said silicide layer being implanted with a dopant of a predetermined impurity; and
at least one active region of said semiconductor device

comprising a diffusion region formed by the migration of said implanted dopant from the silicide into the tub region





and disposed adjacent to a selected doped portion of said silicide layer.

4,987,472

COMPOUND SEMICONDUCTOR EPITAXIAL WAFER

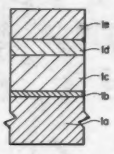
Masahisa Endo; Nobuhiko Noto, and Toshiharu Takahashi, all of Gunma, Japan, assignors to Shin-Etsu Handotai Co. Ltd., Tokyo, Japan

Continuation-in-part of Ser. No. 328,764, Mar. 27, 1989, abandoned, which is a continuation of Ser. No. 165,597, Mar. 8, 1988, abandoned. This application Sep. 19, 1989, Ser. No. 409,132

Claims priority, application Japan, Mar. 16, 1987, 62-60784

Int. Cl.[5] H01L *29/04, 33/00, 29/161, 29/205*

U.S. Cl. 357—60 **2 Claims**



1. A wafer of gallium phosphide single crystal having an epitaxial layer of gallium phosphide arsenide mixed crystal formed on one surface, which comprises:

(A) a substrate of a gallium phosphide single crystal in the form of a wafer; and

(B) an epitaxial layer of gallium phosphide arsenide mixed crystal having a composition represented by the formula $GaAs_{1-x}P_x$, where x is zero or a positive number not exceeding 1, formed on the surface of the substrate by the method of vapor-phase deposition, in which the surface plane of the substrate wafer is selected from the group consisting of:

(a) the crystallographic planes inclined from the (001) plane in the [110] or [$\bar{1}$10] direction;

(b) the crystallographic planes inclined from the (00$\bar{1}$] plane in the [1$\bar{1}$0] or [$\bar{1}$10] direction;

(c) the crystallographic planes inclined from the (100) plane in the [011] or [0$\bar{1}$1] direction;

(d) the crystallographic planes inclined from the ($\bar{1}$00) plane in the [01$\bar{1}$] or [0$\bar{1}$1] direction;

(e) the crystallographic planes inclined from the (010) plane in the [101] or [$\bar{1}$0$\bar{1}$] direction; and

(f) the crystallographic planes inclined from the (0$\bar{1}$0) plane in the [10$\bar{1}$] or [$\bar{1}$01] direction,

the angles of inclination being each in the range from 8° to 15°.

4,987,473

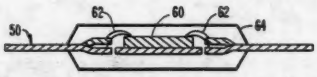
LEADFRAME SYSTEM WITH MULTI-TIER LEADS

Dean P. Johnson, Cupertino, Calif., assignor to VLSI Technology, Inc., San Jose, Calif.

Filed Aug. 3, 1989, Ser. No. 389,038

Int. Cl.[5] H01L *23/48, 23/54*

U.S. Cl. 357—70 **6 Claims**



1. A package for holding a semiconductor die of a predetermined size, comprising:

a unitary leadframe including a die attach pad and leads with lead tips in the vicinity of the pad, said leads being an integral part of the unitary leadframe;

means for electrically connecting said lead tips to selected points on said die, said tips being in two or more different planes; and

a body enclosing said leadframe, the die and the connecting means to fix the positions of the leadframe and the connecting means relative to the die, said leads being so located relative to the die attach pad that when the die is supported by the die attach pad, and when the die, the leads and connecting means are fixed in position by the body, the tips of the leads are spaced apart from the die.

4,987,474

SEMICONDUCTOR DEVICE AND METHOD OF MANUFACTURING THE SAME

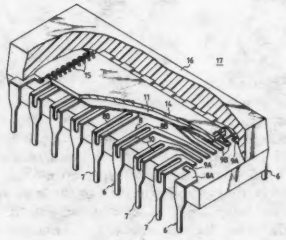
Toshihiro Yasuhara, Kokubunji; Masachika Masuda, Kodaira; Asao Nishimura, Ushiku; Naozumi Hatada, Yokohama; Sueo Kawai, Ibaragi; Makoto Kitano, Chiyoda; Hideo Miura, Chiyoda; Akihiro Yaguchi, Chiyoda, and Gen Murakami, Machida, all of Japan, assignors to Hitachi, Ltd., Tokyo, Japan

Continuation of Ser. No. 245,205, Sep. 16, 1988, abandoned. This application Jun. 12, 1990, Ser. No. 536,932

Claims priority, application Japan, Sep. 18, 1987, 62-232201; Nov. 20, 1987, 62-293742; Jan. 22, 1988, 63-10709; Sep. 19, 1988, 63-205930

Int. Cl.[5] H01L *23/48, 23/28, 29/48;* **H02G** *13/08*

U.S. Cl. 357—70 **60 Claims**



1. A semiconductor device comprising:

a semiconductor pellet which has a principal surface and a rear surface;

a plurality of external terminals which are formed on said principal surface of said semiconductor pellet;

leads provided for said semiconductor pellet including ones which function as signal lines associated with said semiconductor pellet, said leads having inner lead portions and outer lead portions, respectively, and said pellet being disposed over said leads and being supported by some of said inner lead portions;

means, disposed on said inner lead portions between said pellet and said inner lead portions, for electrically insulating said pellet from said some inner lead portions, said inner lead portions having a boundary line effected thereacross by an edge of an end side of said means for electrically insulating;

means for electrically connecting respective external terminals and corresponding ones of said inner lead portions;

a molding member which envelops said pellet, said inner lead portions and said means for electrically connecting; and

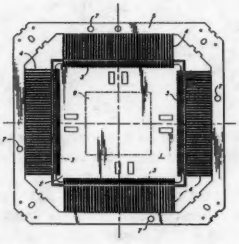
wherein a through hole is provided in, at least, that part of each of said inner lead portions having said boundary line thereacross, each through hole being dimensioned such that it extends on at least the inner lead portion of the corresponding lead thereof in a direction both inwardly and outwardly with respect to said boundary line, the inwardly and outwardly going directions being defined, respectively, as directions toward and away from said semiconductor pellet at the rear surface thereof.

4,987,475

ALIGNMENT OF LEADS FOR CERAMIC INTEGRATED CIRCUIT PACKAGES

Randall L. Schlesinger, Oakham; Kevin M. Eastman, Lincoln, and Douglas F. Palino, Marlboro, all of Mass., assignors to Digital Equipment Corporation, Maynard, Mass.

Continuation of Ser. No. 161,914, Feb. 29, 1988, abandoned.
This application Dec. 5, 1989, Ser. No. 449,518
Int. Cl.[5] B01J *17/00*; B05D *5/12*; H01L *23/48*
U.S. Cl. 357—70 **3 Claims**



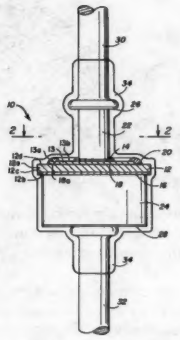
1. An intermediate product for use in the manufacture of a ceramic IC component with individual fine pitch metallic leads brazed to braze pads on a leadless ceramic IC package, which leads extend a substantial distance outwardly of said package, said product comprising a leadless ceramic IC package having a plurality of leadless braze pads on one planar surface thereof, said braze pads being spaced 0.025 plus/minus 0.002 inch center to center, a planar self-supporting metallic lead frame, a plurality of fine metallic leads extending inwardly of said lead frame to lead terminations aligned with and brazed to said braze pads, a web bar interconnecting said fine leads adjacent to, and within about .06 inches of, their terminations and spaced outwardly of said IC package, and means for aligning said lead frame with respect to a punch tool to be used for severing said web from said leads and said leads from said lead frame.

4,987,476

BRAZED GLASS PRE-PASSIVATED CHIP RECTIFIER

Michael Korwin-Pawlowski, Ft. Salonga, N.Y., assignor to General Instrument Corporation, New York, N.Y.

Continuation of Ser. No. 339,485, Apr. 17, 1989, abandoned, which is a division of Ser. No. 151,066, Feb. 1, 1988, abandoned.
This application Feb. 14, 1990, Ser. No. 480,367
Int. Cl.[5] H01L *23/28, 23/30*
U.S. Cl. 357—74 **5 Claims**



1. A semiconductor device comprising:

a semiconductor die (12) having a substrate (12*a*) of one conductivity type with a lower surface (12*b*), an upper surface (12*d*) and an outer periphery (12*c*), said semiconductor die including a semiconductor layer (13) of opposite conductivity type connected to the upper surface (12*d*) of said substrate (12*a*) at a junction (18), said semiconductor layer (13) having an outer periphery (13*a*) and said junction (18) having an outer edge (18*a*) which is adjacent said outer periphery (13*a*) of said semiconductor layer (13), said semiconductor layer (13) having an upper surface (13*b*);

a glass layer (20) covering said edge (18*a*) of said junction and all of said periphery (13*a*) of said semiconductor layer (13), said glass layer (20) covering at least a portion of the upper surface (13*b*) of said semiconductor layer (13) and a portion of the upper surface of said substrate (12*d*) adjacent the periphery (13*a*) of said semiconductor layer (13), said glass layer (20) being spaced inwardly of the outer periphery (12*c*) of said substrate (12*a*);

a first metalization (16) on the lower surface (12*b*) of said substrate (12*a*) spaced away from and contacting no part of said glass layer (20);

a second metalization layer (14) on the upper surface (13*b*) of said semiconductor layer (13) spaced inwardly from and contacting no part of said glass layer (20);

a first contact member (24) brazed by high temperature brazing of material having a melting point above 575° C. to said fist metalization layer (16);

a second contact member (22) brazed by high temperature brazing of material having a melting point above 575° C. to said second metalization layer (14); and

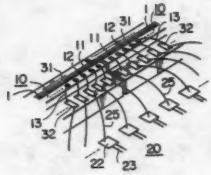
the periphery (13*a*) of said semiconductor layer (13) and the edge (18*a*) of said junction (18) being spaced inwardly from the periphery (12*c*) of said substrate (12) and being positioned on the upper surface (12*d*) of said substrate (12), said first metalization layer (16) covering the lower surface of said substrate and said second metalization layer (14) being surrounded by and spaced inwardly from said glass layer (20).

4,987,477

SOLID STATE IMAGING DEVICE

Masahiko Ikeno, Itami, Japan, assignor to Mitsubishi Denki Kabushiki Kaisha, Japan

Filed Nov. 2, 1989, Ser. No. 430,419
Claims priority, application Japan, Jul. 10, 1989, 1-175588
Int. Cl.[5] H01L *23/16, 23/02, 23/12, 39/02*
U.S. Cl. 357—75 20 Claims



1. A solid state imaging device comprising:

a plurality of solid state imaging device chips, each chip having a picture element array and a plurality of bonding pads;

a plurality of chip carriers on which corresponding solid state imaging device chips are mounted, each chip carrier having a substantially rectangular shape from which at least one corner has been removed to form a cutout, and a plurality of terminals electrically connected to respective bonding pads on the solid state imaging device chip mounted thereon;

a package board on which said plurality of chip carriers are mounted, a cutout of one chip carrier receiving a corner of an adjacent chip carrier; and

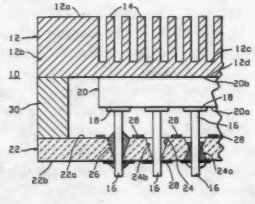
external leads disposed on said package board and electrically connected to corresponding terminals of said plurality of chip carriers.

4,987,478

MICRO INDIVIDUAL INTEGRATED CIRCUIT PACKAGE

Robert E. Braun, Norristown, and Ronald T. Gibbs, King of Prussia, both of Pa., assignors to Unisys Corporation, Blue Bell, Pa.

Filed Feb. 20, 1990, Ser. No. 481,252
Int. Cl.[5] H01L *23/02, 23/12, 39/02, 23/42*
U.S. Cl. 357—81 12 Claims



1. A micro hermetic single die integrated circuit package comprising:

a heat exchange element having an outer surface and an inner planar surface,

a die having planar front and back surfaces, a plurality of area pads distributed in a predetermined configuration on the front surface of said die, a plurality of wires having inner and outer extremities, said inner extremities of said wires being bonded respectively to said area pads, said wires emanating orthogonally from said front surface of said die, the back surface of said die being attached to said inner planar surface of said heat exchange element,

a cover plate having planar inner and outer surfaces, a plurality of holes formed in said cover plate, said holes being homologously positioned with respect to said plurality of area pads on said die,

a seal ring attached to the respective peripheries of the inner surfaces of said heat exchange element and said cover plate,

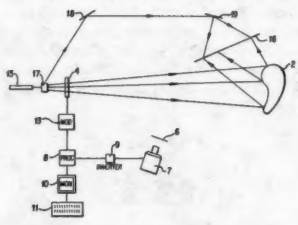
said outer extremities of said wires being disposed within said holes and being accessible at the outer surface of said cover plate, and means for sealing said wires to said cover plate, thereby effecting an hermetic package.

4,987,479

METHOD OF PREPARING A COLOR HOLOGRAM SUITABLE FOR DISPLAY PURPOSES

Anthony I. Hopwood, Macclesfield, England, assignor to Ilford Limited, Cheshire, England

Filed Mar. 23, 1989, Ser. No. 328,004
Claims priority, application United Kingdom, Mar. 24, 1988, 8807029
Int. Cl.[5] H04N *15/00*
U.S. Cl. 358—3 14 Claims



1. A method of preparing a hologram of an object on holographic material by a holographic laser exposure which comprises

(a) illuminating the object with white light and capturing the luminance values of the object using a means for detecting having a filter which simulates the response of the human eye to luminance values and which detector means is placed as if it were along the axis of the laser to be used for the holographic exposure and storing the luminance information as a positive image,

(b) illuminating the object with incident light of substantially the same wavelength as the laser light to be used for the holographic exposure and capturing the reflectance values from the object using a said means for detecting which is placed as if it were along the axis of the laser to be used for the holographic exposure and storing the reflectance information as a 'negative' image,

(c) carrying out a holographic exposure of the object on to holographic material there being present in the object beam between the laser and the object light modulation means which represents the sum of the stored luminance and reflectance information and

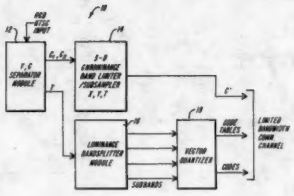
(d) processing the holographic material to fix the holographic fringes therein.

4,987,480

MULTISCALE CODING OF IMAGES

Andrew B. Lippman, Salem, Mass., and William J. Butera, Arlington, Va., assignors to Massachusetts Institute of Technology, Cambridge, Mass.

Filed Jul. 11, 1989, Ser. No. 378,071
Int. Cl.[5] H04N *11/04*
U.S. Cl. 358—13 20 Claims



1. A method of encoding an image, the image including a plurality of frames defined by a set of chrominance and luminance values, the method comprising the steps of

recursively decomposing, to at least two levels of recursion, the luminance values of sequential frames into spatio-temporal spectral components, said spatio-temporal spectral components including a plurality of spatial components and a plurality of temporal components,

said decomposing step including the steps of

quadrature mirror filtering signals representative of said luminance values and

subsampling said filtered signals, and

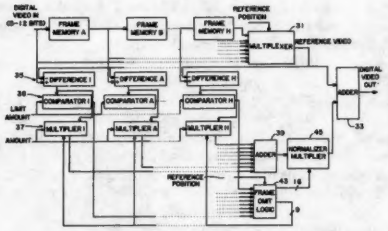
coding each recursively decomposed level of at least one of said spectral components by vector quantization.

4,987,481

VIDEO NOISE REDUCTION SYSTEM

Steven Spears, West Covina, and David Walker, Glendora, both of Calif., assignors to Walker Digital Audio Video Systems, Inc., Covina, Calif.

Filed Apr. 28, 1989, Ser. No. 345,115
Int. Cl.[5] H04N *5/213, 9/64*
U.S. Cl. 358—36 16 Claims



1. A circuit for reducing random noise in a video signal generated by a source external to said circuit by non-recursively averaging video information contained in a current video frame and a plurality of adjacent video frames delayed in time from said current video frame, said circuit comprising processor means for non-recursively averaging video information contained in said video signal for said current video frame and predetermined ones of said plurality of adjacent video frames and within predetermined portions of each of said video frames, wherein a predetermined one of said adjacent video frames is a reference frame;

wherein said processor means comprises:

(a) means for delaying the current video frame by at least one frame;

(b) means for deriving at least one signal representing a difference between each of said plurality of adjacent video frames and said reference frame;

(c) a window comparitor means corresponding to each of said plurality of adjacent video frames for generating a signal when said difference signal is outside a predetermined noise window;

(d) means for selectively averaging the at least one difference signal which is within said predetermined noise window;

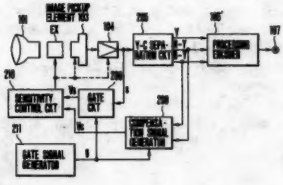
(e) means for combining said averaged difference signal with said reference frame to thereby produce a video frame wherein random noise has been reduced.

4,987,482

IMAGE PICKUP APPARATUS HAVING EXPOSURE CONTROL FOR HUMAN SUBJECTS

Kunio Imai; Hideo Homma, both of Tokyo, and Teruo Hieda, Kanagawa, all of Japan, assignors to Canon Kabushiki Kaisha, Tokyo, Japan

Filed Oct. 24, 1988, Ser. No. 261,567
Claims priority, application Japan, Oct. 27, 1987, 62-269333; Nov. 2, 1987, 62-275866
Int. Cl.[5] H04N *5/243*
U.S. Cl. 358—41 17 Claims



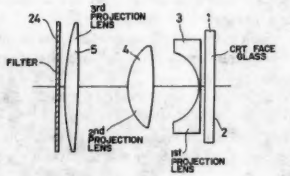
1. An image pickup apparatus for outputting an image pickup signal by forming an image of a subject on an image pickup element through an optical system, comprising: determining means for detecting quantity of a skin color signal component of the subject, and control means for controlling an exposure of said image pickup element in accordance with the result of the determination.

4,987,483

PROJECTION TELEVISION SET

Kazuo Tsukagoshi, Nagaokakyo, Japan, assignor to Mitsubishi Denki Kabushiki Kaisha, Tokyo, Japan

Filed Mar. 31, 1989, Ser. No. 331,506
Claims priority, application Japan, Apr. 4, 1988, 63-82655
Int. Cl.[5] H04N *9/18, 5/74, 5/72*
U.S. Cl. 358—64 10 Claims



1. A projection television apparatus comprising:

red, green and blue CRT; and

red, green and blue projection lens systems respectively associated with the red, green and blue CRT, each projection lens system receiving light from the associated CRT and projecting ii onto a common projection screen; said projection lens system associated with said green CRT including,

a lens, having a surface on which a coating is formed, said coating being disposed on an output side of the lens, from which light exits the lens and is subsequently projected onto said common projection screen, and reflecting light below approximately 520 nm and above approximately 570 nm in wavelength, said surface on which said coating is formed having a small angle of incidence so that light between 520 nm and 570 nm in wavelength transmitted through said lens and said coating travels a distance through said coating which is substantially equal to the thickness of said coating so as to assure the proper transmission of light between approximately 520 nm and 570 nm in wavelength.

4,987,484

HALFTONE IMAGE SIGNAL PROCESSING APPARATUS IN WHICH PIXELS OF A DITHER THRESHOLD PATTERN ARE EACH DIVIDED INTO AN OPERATOR-SELECTED NUMBER OF MICROPIXELS

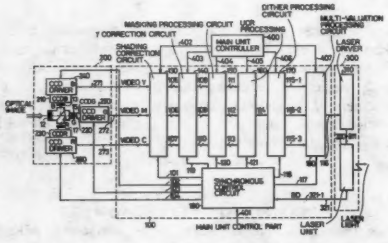
Yoshinori Ikeda, Hira; Tadashi Yoshida, Ichikawa; Kimiyoshi Hayashi, Tokyo; Shunichi Abe; Nobuo Matsuoka, both of Kawasaki; Mitsuo Akiyama, Higashi Murayama, and Yoshinobu Mita, Kawasaki, all of Japan, assignors to Canon Kabushiki Kaisha, Tokyo, Japan

Continuation of Ser. No. 63,741, Jun. 18, 1987, abandoned, which is a continuation-in-part of Ser. No. 585,603, Mar. 2, 1984, abandoned. This application May 22, 1989, Ser. No. 355,835

Claims priority, application Japan, Mar. 6, 1983, 58-36515

Int. Cl.[5] H04N *1/46*

U.S. Cl. 358—75 **25 Claims**



1. An image signal binarizing process comprising the steps of:

inputting an image signal representative of an image;

providing a threshold pattern formed by a plurality of pixels, each of said pixels corresponding to a different pixel of the image represented by said image signal;

dividing each pixel of said threshold pattern into a plurality of micropixels, each pixel having the same number of micropixels;

setting a different threshold value for each of said micropixels;

processing said image signal in accordance with said threshold values of said micropixels to produce a binary image signal; and

selecting the number of micropixels in one pixel;

wherein the size of said micropixels in each pixel is reduced as the number of micropixels increases.

4,987,485

IMAGE READING APPARATUS WITH IMPROVED OUTPUT CORRECTION OF IMAGE SIGNAL

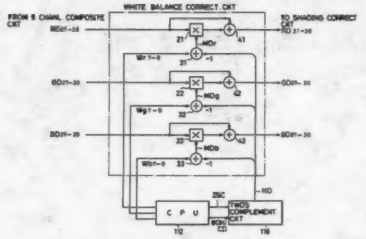
Yoshihiko Hirota, Osaka, Japan, assignor to Minolta Camera Kabushiki Kaisha, Osaka, Japan

Filed Dec. 20, 1989, Ser. No. 453,996

Claims priority, application Japan, Dec. 22, 1988, 63-324265; Dec. 22, 1988, 63-324266

Int. Cl.[5] G03F *3/08*; H04N *1/46, 9/73*

U.S. Cl. 358—80 **10 Claims**



1. An image reading apparatus for reading a color image to separate the image into three primary colors by an image sensor and outputting image data corresponding to each of the colors, comprising:

scanning means for making the image sensor relatively scan for a reference chart and an original;

A/D conversion means for converting an output of said image sensor into digital data corresponding to each of the three primary colors;

operation means for evaluating correction data of said each color from the output of said image sensor when said image sensor scans said reference chart;

multiplication means for multiplying digital data of said each color by said evaluated correction data; and

addition means for adding digital data before being multiplied to a result of the multiplication by said multiplication means.

4,987,486

AUTOMATIC INTERACTIVE TELEVISION TERMINAL CONFIGURATION

Lee R. Johnson, Lawrenceville; Elizabath A. Smith, Cumming, and Howard L. Myers, Lawrenceville, all of Ga., assignors to Scientific-Atlanta, Inc., Atlanta, Ga.

Filed Dec. 23, 1988, Ser. No. 289,218

Int. Cl.[5] H04N *7/14*

U.S. Cl. 358—86 **27 Claims**

1. A two-way interactive cable television entertainment terminal for communicating with a system manager of an entertainment system, the terminal comprising:

an analog transmission link for communicating via a radio frequency transmission media with the system manager,

a processor for processing data,

memory associated with the processor,

a character generator, responsive to the processor, for generating characters for display on a display screen,

a keypad for inputting information to the terminal, the input information for processing by the processor,

a power input,

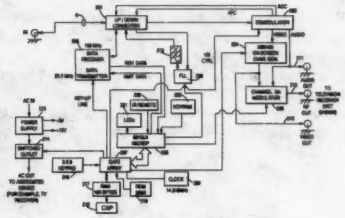
the terminal, responsive to the application of power at the power input, entering an initialization made,

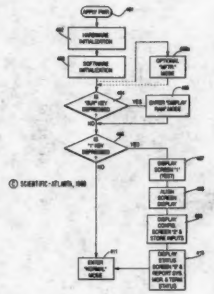
the processor, during the initialization mode, verifying proper operation of terminal components and software,

the terminal, during initialization, entering an automatic installation mode,

the character generator, responsive to the processor, for generating at least one display screen of characters requir-

ing keyboard response, the required response being related to terminal installation,





the terminal, recognizing an appropriate response, configuring itself according to the response prior to entry of the terminal into the entertainment system.

4,987,487

METHOD OF STEREOSCOPIC IMAGES DISPLAY WHICH COMPENSATES ELECTRONICALLY FOR VIEWER HEAD MOVEMENT

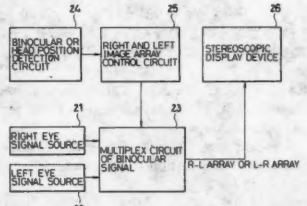
Susumu Ichinose; Nobuji Tetsutani, both of Yokosuka, and Morito Ishibashi, Yokohama, all of Japan, assignors to Nippon Telegraph and Telephone Corporation, Tokyo, Japan

Filed Aug. 9, 1989, Ser. No. 391,881

Claims priority, application Japan, Aug. 12, 1988, 63-199955; Oct. 15, 1988, 63-258362; Feb. 27, 1989, 64-46220

Int. Cl.[5] H04N *13/00*

U.S. Cl. 358—92 **7 Claims**



1. A method of stereoscopic image display for providing right and left eye images to right and left eyes of the viewer using a viewing lenticular lens sheet constituted by an array of lenticular lenses on which is disposed a combined image obtained by combining pixels for the right and left eye images having binocular disparity data, said method comprising the steps of:

detecting a position of the viewer; and

changing positions of the pixels for the right and left eye images on the combined image in accordance with the detected position of the viewer, so that the right and left eye images are always correctly provided to the right and left eyes of the viewer.

4,987,488

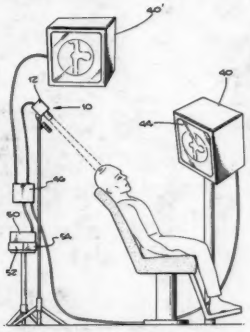
VIDEO SYSTEM FOR VISUALIZING MICROSURGICAL IMAGES WITH ENHANCED DEPTH OF FIELD

George Berci, 1271 Stoner Ave. #409, Los Angeles, Calif. 90025

Filed Mar. 7, 1988, Ser. No. 164,517

Int. Cl.[5] H04N *7/18*

U.S. Cl. 358—93 **22 Claims**



1. An apparatus for visualizing a surgical field to assist in microsurgical procedures comprising in combination:

a. a light source for illuminating the surgical field;

b. a high resolution video camera having a sensitive image receiving area of from 6–10 mm in diameter;

c. a large screen, high resolution video monitor coupled to said camera for displaying a greatly enlarged view of the images of the surgical field impinging upon said image receiving area; and

d. a lens system coupled to said video camera for applying images of the surgical field of said image receiving area, said lens system having a field of view imaging area ranging from 15 to 25 mm in diameter from a distance ranging from 150–500 mm, with a depth of field ranging from1-0–20 mm;

whereby objects of interest in the surgical field can be displayed on said video motor with a magnification greater than three times to aid in microsurgical procedures so that the video monitor provides the primary image for the performance of such microsurgical procedures.

4,987,489

APPARATUS FOR GENERATING AN INTERLACED SLOW MOTION VIDEO OUTPUT SIGNAL BY SPATIAL AND TEMPORAL INTERPOLATION

Terry R. Hurley, Newbury, England, and Naoki Nishio, Hadano, Japan, assignors to Sony Corporation, Tokyo, Japan

Filed Sep. 6, 1989, Ser. No. 403,479

Claims priority, application United Kingdom, Sep. 21, 1988, 8822186

Int. Cl.[5] H04N *7/01*

U.S. Cl. 358—105 **21 Claims**

1. A slow motion video signal generation apparatus for

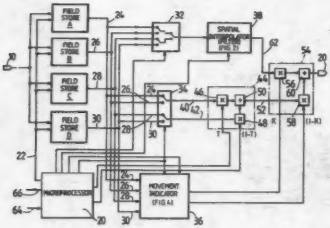
generating an interlaced slow motion video output signal comprising:

storage means for storing a plurality of successive fields of an input video signal;

spatial interpolation means for spatially interpolating between lines of a field selected from said successive fields in said storage means to produce a field of a spatially interpolated video signal for each field of said slow motion video output signal;

temporal filter means for performing linear temporal interpolation between a pair of said successive fields in said storage means which have the same interlace polarity to produce a field of a temporally interpolated video signal for each field of said slow motion video output signal;

control means for controlling the selection of said successive fields stored in said storage means for supply to said temporal filter means and for further selecting one of said successive fields which is temporally closest to said slow



motion video output signal for supply to said spatial interpolation means for each field of said slow motion video output signal;

combining means receiving said spatially interpolated video signal and said temporally interpolated video signal for producing said slow motion video output signal therefrom; and

movement indicator means for comparing said successive fields stored in said storage means to detect local movement in a picture represented by said successive fields and in response to detection of said movement for controlling said combining means such that said slow motion video output signal is substantially constituted by said temporally interpolated video signal in picture areas where substantially no movement is detected and is substantially constituted by said spatially interpolated video signal in picture areas where more than a predetermined amount of movement is detected.

4,987,490

DECODING DEVICE CAPABLE OF FORWARDLY AND BACKWARDLY REPRODUCING PICTURES WITH A HIGH QUALITY

Mutsumi Ohta, Tokyo, Japan, assignor to NEC Corporation, Japan

Filed May 15, 1990, Ser. No. 523,856

Claims priority, application Japan, May 15, 1989, 1-122436

Int. Cl.[5] H04N 7/12

U.S. Cl. 358—136 **10 Claims**

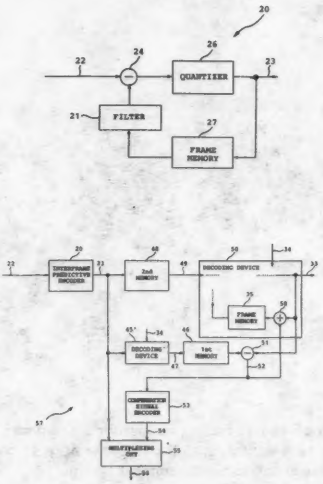
1. A decoding device for use in combination with a recording medium on which an encoded signal is recorded, said encoded signal being produced by an encoding device which is for carrying out interframe predictive encoding of a digital video signal comprising successive frames of a common frame period, said decoding device being for decoding a device input signal into a decoded signal in response to a mode signal which indicates whether said device input signal is produced in a forward direction from a leading part of said encoded signal to a trailing part of said encoded signal or in a backward direction reversed relative to said forward direction, said decoding device comprising:

delaying means for delaying said decoded signal into a delayed signal with a delay which is equal to said frame period;

first filtering means having a predetermined frequency response characteristic for filtering said delayed signal to produce a first filtered signal;

adding means for adding said device input signal to said first filtered signal to produce an added signal;

subtracting means for subtracting said device input signal from said delayed signal to produce a subtracted signal;



second filtering means having an inverse frequency response characteristic relative to said predetermined frequency response characteristic for filtering said subtracted signal to produce a second filtered signal; and

selecting means responsive to said mode signal for selecting one of said added and said second filtered signals to produce, as said decoded signal, said added and said second filtered signals when said mode signal indicates that said device input signal is produced in said forward direction and when said mode signal indicates that said device input signal is produced in said backward direction, respectively.

4,987,491

JITTER COMPENSATION CIRCUIT FOR PROCESSING JITTER COMPONENTS OF REPRODUCED VIDEO SIGNAL

Osamu Kaite, Osaka; Takahiro Yuchi, Hyogo, and Hirotsugu Murashima, Nara, all of Japan, assignors to Sanyo Electric Co., Ltd., Osaka, Japan

Filed Jan. 12, 1990, Ser. No. 472,982

Claims priority, application Japan, Jan. 20, 1989, 1-12712; Jul. 4, 1989, 1-172461

Int. Cl.[5] H04N 5/95

U.S. Cl. 358—166 **9 Claims**

1. A jitter compensation circuit for processing jitter components of a reproduced video signal, comprising:

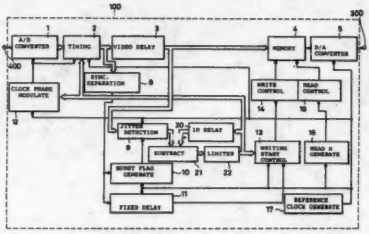
means (400) for supplying said reproduced video signal including at least a horizontal synchronizing signal component, a bust signal component and a video signal component in one horizontal period,

clock phase modulating means (12) for supplying a phase modulated clock,

A/D converting means (1) for convering said reproduced video signal into a digital signal in sychronization with said phase modulated clock,

jitter detecting means (10, 9) for generating jitter detection data for every horizontal period based on a digital value of said burst signal component by said A/D converting means,

compensation data generating means (20, 21) for generating jitter compensaton data in every horizontal period based on said jitter detection data, said compensation data generating means generating the latest jitter compensation data



based on said jitter detection data and said jitter compensaton data one horizontal period before,

memory (4) for temporarily storing a digital value of said video signal component by said A/D converting means,

means (14, 15, 16) for writing and reading said digital value of the video signal component to and from said memory, and

means for defining a timing for starting to write said digital value of the video signal component to siad memory so as to cancel said jitter components based on said jitter compensation data,

said clock phase modulating means controlling a phase of said phase modulated clock so as to cancel said jitter components based on said jitter compensation data.

4,987,492

USER INTERFACE CONTROL FOR COMMUNICATION SYSTEM

Robert A. Stults, 2290 Yale St., Palo Alto, Calif. 94306; Steven R. Harrison, 134 Russell Ave., Portola Valley, Calif. 94025-7214; Thomas E. Merrow, 3118 SW. Casade Dr., Portland, Oreg. 97201; Jane J. Laursen, 16972 SW. Greentree Ave., Lake Oswego, Oreg. 97034; George O. Goodman, 16770 NW. Coburg La., Beaverton, Oreg. 97006; Jay Trow, 1924 San Ramon, Mountain View, Calif. 94043, and Mark J. Abel, 3800 E. Orchard R., Littleton, Colo. 80121

Filed Sep. 28, 1987, Ser. No. 101,711

Int. Cl.[5] H04N *5/262, 1/42*

U.S. Cl. 358—181 **18 Claims**

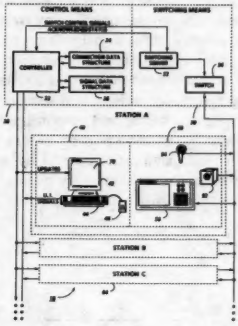
1. A system comprising:

first and second stations at respective first and second locations, the first station comprising a first display and a first user input device, the second station comprising a second display and a second user input device;

first and second communication devices, the first communication device being at the first location with the first station and the second communication device being at the second location with the second station;

switching means for performing a switching operation in response to a switch control signal; the switching operation affecting a connection between the first and second communication devices; and

control means connected for receiving signals from the first and second user input devices requesting switches in the connection; the control means further being connected for providing the switch control signal to the switching means in response to a respective one of the signals from the first and second user input devices; the control means comprising a connection data structure containing connection data indicating the connection; the control means



updating the connection data structure after providing the switch control signal; the control means further being connected for providing update data so that the first and second displays each present a respective representation of the connection between the first and second communication devices that is consistent with the updated connection data structure.

4,987,493

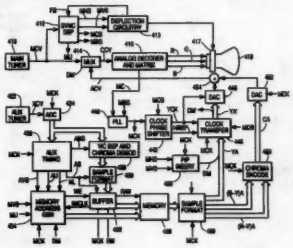
MEMORY EFFICIENT INTERLACE APPARATUS AND METHOD AS FOR A PICTURE IN A PICTURE DISPLAY

Barth A. Canfield, Indianapolis, Ind.; Russell T. Fling, Naperville, Ill., and Donald H. Willis, Indianapolis, Ind., assignors to RCA Licensing Corporation, Princeton, N.J.

Filed Aug. 1, 1989, Ser. No. 387,745

Int. Cl.[5] H04N *5/262, 5/450*

U.S. Cl. 358—183 **9 Claims**



1. In a system for concurrently displaying first and second video images derived from respective first and second mutually asynchronous video signals, each of said video signals being divided into a succession of field intervals, each field interval including a sequence of line intervals, means for synchronizing the display of the second video signal to the first video signal, comprising:

signal storage means including:

main memory means including a sufficient amount of memory to hold one field interval of the second video signal; and

crossover memory means including an amount of memory

sufficient to hold one line interval of said second video signal;

signal processing means for storing said second video signal in said signal storage means and for retrieving said stored video signal from said signal storage means comprising:

monitoring means, coupled to said signal processing means, for generating a control signal when an overlap is detected between the signal being stored in said main memory means and the signal being retrieved from said main memory means, and for determining in which line interval of said second signal said overlap occurs; and

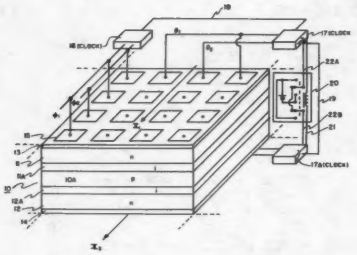
signal routing means, for writing said second video signal to said main memory means and responsive to said control signal for writing at least a portion of said line interval of said second video signal determined by said monitoring means into said crossover memory means.

4,987,494

SYSTEM FOR PARALLEL TRANSFER BETWEEN CCD ARRAYS

Charles F. Freeman, Springfield, Va., assignor to The United States of America as represented by the Secretary of the Army, Washington, D.C.

Filed Dec. 7, 1989, Ser. No. 447,481
Int. Cl.[5] H04N *3/14, 5/335;* H01L *29/78*
U.S. Cl. 358—213.11 **10 Claims**



1. A composite multilayer CCD structure comprising:

two monolayer CCD's formed on first and second layers with the same polarity type of doped semiconductor material each supporting an array of electrodes, at least one CID, and electronic clock means interconnecting said electrodes;

a boundary layer including a third layer of doped semiconductor material of opposite polarity type joining said first and second layers such that at least some of said electrodes form normally opposing pairs through said layers; and

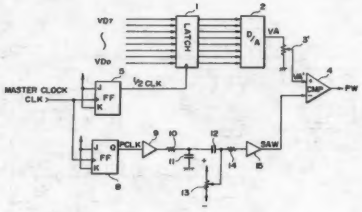
said clock means including intermittent biasing means for applying sufficient potential between said opposing pairs of electrodes to cause charge to flow through said boundary layer.

4,987,495

IMAGE PROCESSING APPARATUS WITH IMAGE FORMATION CONDITION DETECTION FOR CONTROL OF PROCESSING

Hitoshi Arai, Yokohama, Japan, assignor to Canon Kabushiki Kaisha, Tokyo, Japan

Division of Ser. No. 10,539, Feb. 3, 1987, Pat. No. 4,847,695.
This application Apr. 26, 1989, Ser. No. 343,269
Claims priority, application Japan, Feb. 6, 1986, 61-22835; Apr. 3, 1986, 61-75482; Apr. 3, 1986, 61-75483
Int. Cl.[5] H04N *1/40*
U.S. Cl. 358—448 **6 Claims**



1. An image processing apparatus, comprising:

means for generating an image signal composed of a plurality of bits;

means for gradation processing the image signal generated by said generating means to output a pulse-width-modulate signal;

means for effecting image formation on the basis of the pulse-width-modulated signal output from said gradation processing means;

means for detecting an image formation condition; and

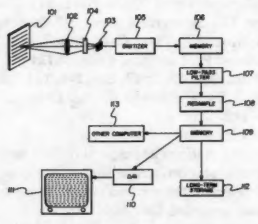
means for controlling a generation mode in which said gradation processing means provides the pulse-width-modulated signal on the basis of the result of detection performed by said detecting means.

4,987,496

SYSTEM FOR SCANNING HALFTONED IMAGES

John E. Greivenkamp, Jr., Rochester, N.Y., assignor to Eastman Kodak Company, Rochester, N.Y.

Filed Sep. 18, 1989, Ser. No. 408,819
Int. Cl.[5] H04N *1/40*
U.S. Cl. 358—448 **5 Claims**



1. A method of displaying on a medium characterized by horizontal and vertical spatial resolutions r_{dx} and r_{dy} a halftoned image characterized by a half-tone frequency f_h, comprising:

low-pass filtering said image with respective horizontal and vertical low pass frequency f_x and f_y which are equal to or greater than said horizontal and vertical display resolutions r_{dx} and r_{dy}, respectively, and less than either the

second or third harmonics of said halftone frequency f_h, so as to generate a prefiltered image;

sampling said prefiltered image at respective horizontal and vertical sampling frequencies f_{sx} and f_{sy} which are between four and six times said horizontal and vertical display resolutions r_x and r_{dy}, respectively, so as to generate an oversampled image;

low-pass filtering said oversampling image with respective horizontal and vertical low-pass frequencies F_x and F_y equal to or greater than said horizontal and vertical display resolutions r_{dx} and r_{dy}, respectively to produce an output image; and

resampling said output image at horizontal and vertical spatial Nyguist sampling frequencies slightly in excess of said horizontal and vertical display resolutions r_{dx} and r_{dy}, respectively so as to generate a display signal, and transmitting said display signal to said medium.

4,987,497

IMAGE EDITING METHOD FOR A DIGITAL COPIER

Tsuyoshi Yoshimura, Tokyo, Japan, assignor to Ricoh Company, Ltd., Tokyo, Japan

Filed Jul. 25, 1989, Ser. No. 384,450
Claims priority, application Japan, Aug. 4, 1988, 63-193475
Int. Cl.[5] H04N *1/40*
U.S. Cl. 358—452 **8 Claims**

1. An image editing method for a digital copier which effects predetermined editing functions on a document which has been marked by a marking signal, comprising the steps of:

generating a marked area on a document which is input into a digital copier by surrounding a predetermined area of said document with a marking signal;

providing a plurality of inside image processing modes in which an area inside of said marked area is subjected to editing processing; and

providing at least one point-out image processing mode in which an area that is marked by the marking signal is subjected to editing processing.

4,987,498

METHOD OF FORMING HALFTONE SCREEN

Osamu Shimazaki, Kanagawa, Japan, assignor to Fuji Photo Film Co., Ltd., Kanagawa, Japan

Filed Aug. 10, 1988, Ser. No. 230,805
Claims priority, application Japan, Aug. 12, 1987, 62-202175
Int. Cl.[5] H04N *1/40*
U.S. Cl. 358—456 **6 Claims**

1. A method of forming a halftone screen in converting a continuous-tone image into a halftone dot image based on halftone screen signals by defining a screen angle as a rotational tangent thereof to establish a basic periodic portion of the halftone screen signals and periodically generating the basic period portion to cover an entire scanned region of the continuous-tone image, said method comprising the steps of:

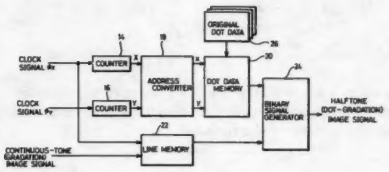
preparing minimum unit dot data items necessary to define said basic period portion as determined by a screen angle and a dot resolution level; and

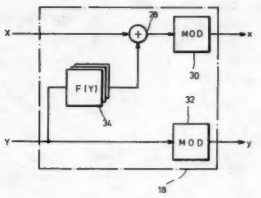
generating said dot data items in a sequence of address signals X, Y which is established based on said screen angle and said dot resolution level to constitute said basic periodic portion;

wherein said dot data items represented by address signals X, Y are converted into dot data items represented by address signals x, y which are defined by:

$$x=\mathrm{MOD}(X+F(Y),N_x)$$

$$y=\mathrm{MOD}(Y,N_y)$$





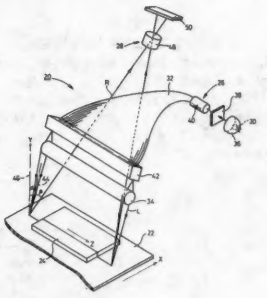
where N_x, N_y are numbers of dot data items of said basic periodic portion in directions X, Y, respectively, F(Y) is an address offset number with respect to the address signal Y, and MOD is a modulo operator.

4,987,499

IMAGE READING DEVICE

Kei Kimura, Kanagawa, Japan, assignor to Fuji Photo Film Co., Ltd., Kanagawa, Japan

Filed Sep. 1, 1989, Ser. No. 401,898
Claims priority, application Japan, Sep. 2, 1988, 63-218374
Int. Cl.[5] H04N *1/04*
U.S. Cl. 358—474 **8 Claims**



1. An image reading device comprising:

original illuminating means for applying illuminating light to a surface of an original which contains image information at an illuminating angle α with respect to a line normal to the surface of the original;

image reading means for reading light containing the image information and reflected by the surface of the original in response to application of the illuminating light thereto at a reading angle β with respect to said line normal to the surface of the original; and

said illuminating angle α and said reading angle β being selected to meet the following relationship:

$$-\alpha-\phi \cong \beta > -90°$$

or

$$-\alpha+\phi \leq \beta < 90°$$

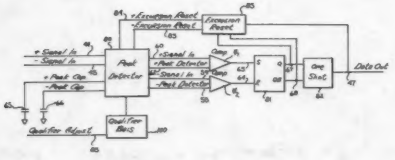
where $\pm\phi(\phi>0)$ is an angle from the regular reflection of said illuminating light in order to remove the surface reflections from the surface of the original.

4,987,500

SELF COMPENSATING HIGH DENSITY DATA RECORDING AND DETECTION SCHEME

John Bizjak, San Jose; Michael Hassel, Milpitas, and David Niemann, Santa Clara, all of Calif., assignors to Brier Technology, Inc., San Jose, Calif.

Filed Nov. 14, 1988, Ser. No. 270,748
Int. Cl.[5] G11B *5/09*
U.S. Cl. 360—46 **9 Claims**



1. A method of detecting flux transitions of an input signal in a magnetic media storage system comprising the steps of:

tracking a peak value of said input signal and maintaining the tracked value at a predetermined level below a maximum amplitude of said input signal;

comparing the peak value of said input signal to said tracked value;

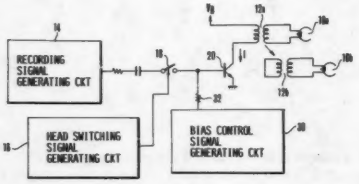
defining a flux transition point as the point at which said peak value of said input signal becomes less than said tracked value.

4,987,501

AMPLIFYING DEVICE

Taizou Hori, Kanagawa, Japan, assignor to Canon Kabushiki Kaisha, Tokyo, Japan

Filed Nov. 7, 1988, Ser. No. 267,804
Claims priority, application Japan, Nov. 12, 1987, 62-285949
Int. Cl.[5] G11B *15/14, 5/03*
U.S. Cl. 360—64 **14 Claims**



1. An amplifying device, comprising:

(a) a load circuit;

(b) a first generating circuit for generating an electric signal relating to an information signal;

(c) a second generating circuit for generating a DC bias signal including a DC component in which rising and falling high frequency components have been removed; and

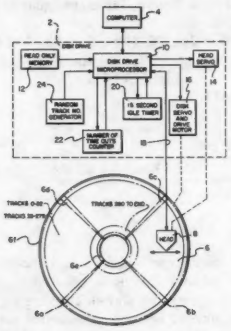
(d) a current supplying element for receiving said electric signal and said DC bias signal and supplying to said load circuit a driving current having a DC component corresponding to said DC bias signal and a current value varying in accordance with said electric signal.

4,987,502

ANTI-WEAR DISK DRIVE SYSTEM

Robin J. Freeze, Milpitas, Calif., assignor to Eastman Kodak Company, Rochester, N.Y.

Filed Oct. 6, 1986, Ser. No. 915,368
Int. Cl.[5] G11B *21/02*
U.S. Cl. 360—75 **9 Claims**



1. A disk drive system adapted to extend the life of a disk through uniform distribution of head contact wear during disk idle times, comprising:

(A) means including a disk servo adaptable to rotate a disk;

(B) a read/write head adaptable to overlie said disk;

(C) a head servo including means for controlling the radial position of said head with respect to said disk;

(D) means for randomly generating a number corresponding to a range of tracks on said disk excluding the most frequently worn tracks thereof; and

(E) means for processing commands received from an external source and for reading and writing data from or to said disk through said head while controlling said disk servo and said head servo in response to said commands, said processing means further performing as:

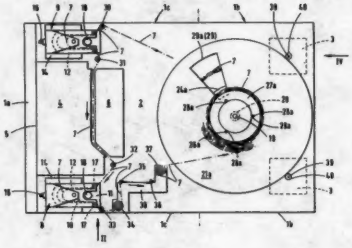
I. means for directing said head servo to move said head to a track on said disk selected by said random number generating means only in absences—lasting a certain minimum idle time—of commands requiring said head servo to position said head over a given track on said disk, and

II. means for directing said disk servo to stop rotating said disk whenever the number of consecutive ones of said absences exceed a certain maximum number, wherein said selected track is confined to a range of tracks excluding the most frequently used tracks on said disk, whereby disk wear is uniformly distributed during a disk idle time exceeding said minimum idle time in a portion of said disk not subject to frequent wear, and whereby unnecessary repositioning of said head is avoided by ignoring instances wherein idleness of said head servo does not exceed said minimum idle time.

4,987,503
METHOD TO PRODUCE PRE-RECORDED TAPE CASSETTES

John P. Gardner, Gresson, Grotherington Fields, Grotherington Cross, Nr. Cheltenham, Glos, United Kingdom

Filed Sep. 2, 1987, Ser. No. 92,327
Int. Cl.[5] G11B 5/008
U.S. Cl. 360—90 11 Claims



1. In a method of producing tape cassettes pre-recorded with program material which method comprises:

(i) providing a non-cassette rotatable supply spool loaded with magnetic tape spooled thereon, said spooled tape forming a generally planar surface of said supply spool;

(ii) providing a non-cassette rotatable take-up spool to receive recorded magnetic tape;

(iii) disposing the supply spool in a first plane of rotation;

(iv) disposing the take-up spool in a second plane of rotation essentially parallel to said first plane of rotation;

(v) providing an active recording head;

(vi) transporting magnetic tape from the supply spool to the take-up spool, with rotation of said spools, via said active recording head, thereby recording program material on said tape and creating a generally planar surface of spooled tape on said take-up spool at the expense of said planar surface of tape of said supply spool; and

(vii) loading recorded tape from said take-up spool into cassettes;

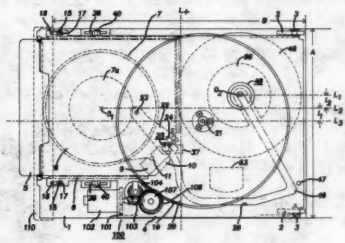
the improvement comprising disposing the supply spool and take-up spool in juxtaposition so that the positions occupied by said generally planar spooled tape surface of said take-up spool and said generally planar surface of tape of said supply spool are interfacially adjacent.

4,987,504
DRIVE AND WINDING REEL ARRANGEMENT IN A MAGNETIC RECORDING AND REPRODUCING DEVICE

Yoshihisa Inoue, Hannou, Japan, assignor to Nakamichi Corporation, Kodaira, Japan

Filed Jan. 26, 1989, Ser. No. 303,266
Claims priority, application Japan, Jan. 27, 1988, 63-16589
Int. Cl.[5] G11B 15/67
U.S. Cl. 360—95 3 Claims

1. A magnetic recording and reproducing apparatus having length, width, and height dimensions, said apparatus being adapted for use with a tape cartridge including a single tape reel having a rotational axis extending in the direction of the height dimension of said apparatus and a magnetic tape wound therearound for feed along a running path extending past a magnetic head of said apparatus and to a winding reel provided by said apparatus, said magnetic tape including a leading end received within a leader block, said apparatus also including leader block guide and drive means to guide and drive said leader block and leading end of said magnetic tape from said tape cartridge to said winding reel, said winding reel having a rotational axis extending in the direction of the height dimension of said apparatus and also including a recess to mount said leader block on said winding reel, said leader block guide and drive means comprising at least an electric motor and transmission means for driving a drawing pin member engageable with said leader block, said tape cartridge having a front face and a side face, said tape cartridge being adapted to be inserted front face-first into said apparatus in an operative position with said single tape reel disposed so that the rotational axis of said single tape reel is positioned on one side of a first line which divides a length of said apparatus into two halves and on one side of a second line which divides the width of said apparatus into two halves, said leader block being disposed on the other side of said second line and said tape cartridge being disposed so that

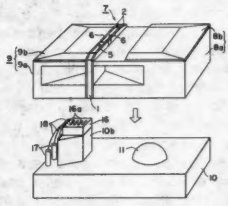


said side face thereof extends along the length dimension of said apparatus, said winding reel being disposed so that said rotational axis of said winding reel is positioned on the other side of said first line and on the one side of said second line, said magnetic head being disposed on the other side of said first line and on the other side of said second line, at least said electric motor being disposed on the one side of said first line and on the other side of said second line, and said second line and said rotational axis of said winding reel being spaced a distance greater than that between said second line and said rotational axis of said single tape reel.

4,987,505
MAGNETIC HEAD DEVICE HAVING PHOTO DETECTOR CELL

Yoshitaka Iwabuchi, Yamato; Yoshiyo Wada, and Toshihiko Nishihata, both of Yokohama, all of Japan, assignors to Victor Company of Japan, Ltd., Yokohama, Japan

Filed Oct. 19, 1988, Ser. No. 259,706
Claims priority, application Japan, Oct. 19, 1987, 62-159443; Oct. 19, 1987, 62-263229
Int. Cl.[5] G11B 5/60, 5/187
U.S. Cl. 360—103 6 Claims



1. A magnetic head device comprising:

a magnetic converter unit and a slider member for holding the magnetic converter unit for recording signals to and reproducing from a recording medium, a base body having an optical sensor affixed thereto for controlling the position of said magnetic head device relative to said recording medium, and a transparent slider surface portion forming an optical path of the optical sensor,

said optical sensor being provided with a photo detector head chip having a plurality of light receiving element sections formed on the surface of a substrate and defining a light sensitive area for providing independent light detection signals depending upon the quantity of an incident light and light insensitive sections adjacent to said light sensitive area alternatively formed on the surface of said substrate, at least said insensitive sections being covered thereon with a light shielding film having a small coefficient of reflection.

4,987,506

CLAMPING MECHANISM FOR CLAMPING A MOVABLE CARRIAGE CARRYING A RECORDING/REPRODUCING HEAD OF AN INFORMATION RECORDING/REPRODUCING APPARATUS

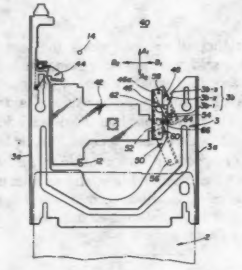
Keiji Uehara, Iruma, Japan, assignor to Tesc Corporation, Japan

Filed Dec. 29, 1988, Ser. No. 291,518

Claims priority, application Japan, Jan. 8, 1988, 63-871[U]; Oct. 5, 1988, 63-130620[U]

Int. Cl.[5] G11B *5/54, 5/55, 17/04*

U.S. Cl. 360—105 **11 Claims**



1. A clamping mechanism for clamping a carriage carrying a recording/reproducing head of an information recording/reproducing apparatus, said recording/reproducing head being adapted for recording and/or reproducing an information signal on and from a disk-shaped rotary recording medium accommodated in a cartridge when the disk-shaped rotary recording medium is loaded in the information recording/reproducing apparatus together with the cartridge, said carriage being provided movably in a body of the information recording/reproducing apparatus for moving the recording/reproducing head carried thereon across the disk-shaped rotary recording medium, said clamping mechanism comprising:

clamping means provided movably on the body of the recording/reproducing apparatus between a clamped state in which the clamping means is engaged with the carriage so that the carriage is fixed to said clamping means and a released state in which the clamping member is disengaged from the carriage so that the carriage is free to move relative to said clamping means; and

actuation means provided movably on the body of the recording/reproducing apparatus between a first state and a second state, said actuation means comprising a holder for accommodating the cartridge when the disk-shaped rotary recording medium is loaded in the apparatus, said actuation means being constructed such that the actuation means makes a mechanical engagement with the cartridge when the cartridge is accommodated in the holder and such that the actuation means assumes the first state and the second state respectively in response to removal and insertion of the cartridge from and into the holder, said actuation means urging said clamping means to said clamped state when the actuation means is in said first state and said actuation means urging said clamping means to said released state when said actuation means is in said second state.

4,987,507

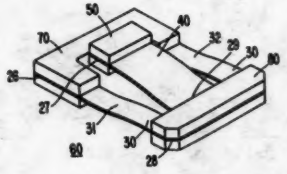
FLEXURE GUIDE FOR STRAIGHT-LINE MOTION

Edward L. Steltzer, Westborough, Mass., assignor to Digital Equipment Corporation, Maynard, Mass.

Filed Mar. 2, 1989, Ser. No. 317,987

Int. Cl.[5] G11B *5/48*

U.S. Cl. 360—106 **24 Claims**



7. A storage device having a stationary frame comprising:

a. a magnetic recording head having first and second ends;

b. a guide device, which prevents said magnetic recording head from tilting, by constraining said magnetic recording head to a linear path said guide device having a first and second end, said first end of said guide device coupled to said first end of said magnetic recording head;

c. a motor coupled to said second end of said guide device, which drives said magnetic recording head;

d. a first flexure guide coupled to said stationary frame and said magnetic recording head which guides said magnetic recording head in a straight line with respect to said frame of said storage device, said first flexure guide having;

(1) a first spring with first and second ends, said first end of said first spring being coupled to said magnetic recording head, and

(2) a second spring with first and second ends, said first end of said second spring being coupled to said frame of said storage device,

(3) wherein said first and second springs have identical spring characteristics and wherein said second ends of said first and second springs are serially coupled to each other,

(4) wherein said second spring is separated into two equal halves which are arranged on opposite sides of said first spring.

4,987,508

PERMANENT MAGNET SHAPED TO PROVIDE UNIFORM BIASING OF A MAGNETORESISTIVE REPRODUCE HEAD

Neil Smith, San Diego, Calif., assignor to Eastman Kodak Company, Rochester, N.Y.

Filed Dec. 23, 1988, Ser. No. 288,926

Int. Cl.[5] G11B *5/39*

U.S. Cl. 360—113 **14 Claims**

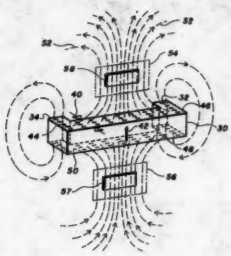
1. A magnet for biasing a magnetoresistive element utilized in a magnetoresistive head, said magnet comprising:

a. magnetic material in the shape of a rectangular parallelepiped bar having mutually orthogonal length, height, and width dimensions, wherein the longest dimension of said magnet is designated as "length" and the two mutually orthogonal shorter dimensions are designated as "height" and "width",

b. magnetization means for uniformly magnetizing said bar along said height dimension, whereby magnetic charges

are generated on first and second surfaces of said bar perpendicular to the direction of said magnetization, and

c. means for modifying the distribution of said charges at the



longitudinal end regions of said bar, whereby the external field of said magnet has an extended region of uniform field for biasing said magnetoresistive element utilized in said magnetoresistive head.

4,987,509

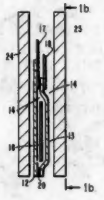
MAGNETORESISTIVE HEAD STRUCTURES FOR LONGITUDINAL AND PERPENDICULAR TRANSITION DETECTION

Hardayal S. Gill, Los Altos, and Victor W. Hesterman, Los Altos Hills, both of Calif., assignors to Hewlett-Packard Company, Palo Alto, Calif.

Filed Oct. 5, 1989, Ser. No. 417,351

Int. Cl.[5] G11B *5/39*

U.S. Cl. 360—113 **18 Claims**



1. A magnetoresistive read head structure comprising:

first and second magnetoresistive members separated by dielectric material and having adjacent noncontacting first ends;

first and second sense current conductors coupled to respective first ends of the first and second magnetoresistive members for providing sense current thereto;

a bias current conductor arrangement disposed adjacent to the first and second magnetoresistive members and dielectrically separated therefrom for providing bias current thereto; and

a common conductor coupled to the second ends of the magnetoresistive members that elecrically shorts the second ends thereof and provides a return path for the sense currents.

4,987,510

THIN FILM MAGNET HEAD FOR VERTICAL MAGNETIZATION

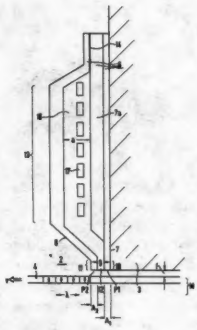
Herbert Schewe, Herzogenaurach, and Dietrich Stephani, Bubenreuth, both of Fed. Rep. of Germany, assignors to Siemens Aktiengesellschaft, Berlin and Munich, Fed. Rep. of Germany

Filed Dec. 9, 1988, Ser. No. 282,390

Claims priority, application Fed. Rep. of Germany, Dec. 11, 1977, 3742136

Int. Cl.[5] G11B *5/147*

U.S. Cl. 360—126 **7 Claims**



1. A thin film magnet head adapted to be guided over a recording medium to be magnetized perpendicularly in which medium flux changes are to be registered along a track with a predetermined record wavelength and flux change density, the head comprising a flux-carrying, ring head-like guiding element having two magnet legs, said magnet legs having magnet poles facing the recording medium which are arranged one behind the other as seen in a relative movement direction of the magnet head with respect to the recording medium, said poles spaced by a gap of predetermined width, and having predetermined extents in the direction of movement, said magnet legs defining outside the region of the magnet poles an interstice through which interstice extend the turns of at least one write and/or read coil winding, the following relation being at least approximately fulfilled:

$$\lambda^* = g + \max(A_1, A_2),$$

where

λ^* is the record wavelength which results for the value D_p of the flux change density for which a read voltage at the read coil winding is maximum, g is the width of the gap and $\max(A_1, A_2)$ is the greater value of the two extents (A_1, A_2) of the magnet poles.

4,987,511

GAPPED ARRESTER

Philip J. Hopkinson, and George W. Mayall, both of Zanesville, Ohio, assignors to Cooper Industries, Inc., Houston, Tex.

Continuation of Ser. No. 164,652, Mar. 7, 1988, abandoned. This application Oct. 30, 1989, Ser. No. 428,876

Int. Cl.[5] H02H *9/04*

U.S. Cl. 361—35 **22 Claims**

1. A distribution-type transformer having a low voltage side surge arrester protector comprising:

a grounded transformer enclosure;

a high voltage transformer winding within said enclosure;

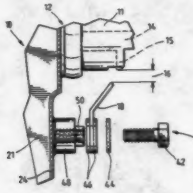
a low voltage transformer winding within said enclosure, said low voltage winding having a grounded neutral;

a low voltage bushing stud of conducting material mounted on said grounded enclosure, and insulated therefrom;

said low voltage bushing stud connected to said low voltage transformer winding; and

means for dissipating surges injected into said low voltage transformer winding via said grounded neutral and via said bushing stud, said dissipating means comprising:

an arc strap adjacent to said bushing and connected to



ground through a resistive material, said resistive material forming an elastomeric grommet;

a gap separating said bushing stud from said arc strap; and

means for electrically connecting said grommet and said arc strap to said grounded transformer enclosure in series relationship and for compressing said grommet a predetermined amount, said connecting means including means for limiting the compression on said grommet to said predetermined amount.

4,987,512

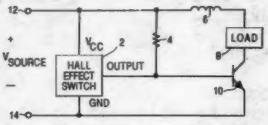
SOLID STATE CIRCUIT PROTECTOR

James P. Mulshine, Pt. Pleasant, N.J., assignor to Inresco, Inc., Manasquan, N.J.

Continuation-in-part of Ser. No. 878,358, Jun. 25, 1986, Pat. No. 4,811,153. This application Mar. 6, 1989, Ser. No. 319,990

Int. Cl.[5] H02H *3/08*

U.S. Cl. 361—57 **6 Claims**



1. A circuit for protecting a load from overcurrent or overvoltage conditions comprising:

a source of input voltage which supplies current to a load a magnetic sensor switch means connected across said source of input voltage, said magnetic sensor switch means changing state in response to a sensed variation in magnetic field;

switch means connected to said magnetic sensor switch means; magnetic field generating means connected in series with said source and said load to generate a magnetic field responsive to said current flowing to said load; said magnetic field generating means magnetically coupled to said magnetic sensor switch means to change the state of said magnetic sensor switch means in response to the magnetic field generated by a predetermined current flowing to said load to change the state of said switch means to disconnect said source from said load.

4,987,513

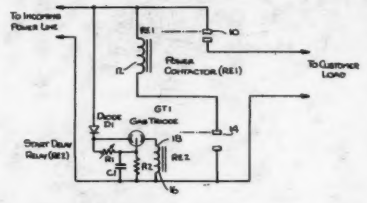
APPARATUS AND METHOD FOR SELECTIVELY DELAYING THE CONNECTION OF AN ELECTRICAL SUPPLY VOLTAGE TO AN ELECTRICAL LOAD

Edwin F. Shelley, 339 Oxford Rd., New Rochelle, N.Y. 10804

Filed Apr. 12, 1989, Ser. No. 337,558

Int. Cl.[5] H02H *3/24*

U.S. Cl. 361—92 **24 Claims**



1. Apparatus coupled between an electrical supply network and an electrical load for delaying the connection of the supply network to the load when the supply voltage has been restored after a supply voltage interruption or reduction comprising:

circuit interruption means coupled between the network and the load for interrupting the circuit between the supply network and the load when the supply voltage has been interrupted or reduced; and

means coupled to said circuit interruption means and to said supply network for sensing when the supply voltage has been restored and for actuating said circuit interruption means to reconnect the supply network and the load at a first predetermined time delay after said supply voltage has been restored, said sensing means comprising a delay circuit comprising a threshold device wherein the threshold device provides and activating signal to said circuit interruption means to reconnect said supply network and load at said first predetermined time delay after said supply voltage has been restored when the supply voltage has been restored for a preset period of time corresponding to said predetermined time delay.

4,987,514

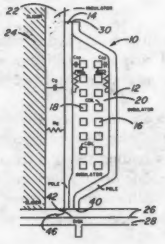
METHOD AND APPARATUS FOR PREVENTING PARASITIC ELECTRICAL DISCHARGES IN MAGNETIC DISK DRIVES

Samuel H. Gailbreath; Boyd N. Shelton, and Richard L. Hilton, all of Boise, Id., assignors to Hewlett-Packard Company, Palo Alto, Calif.

Filed Feb. 15, 1989, Ser. No. 311,486

Int. Cl.[5] G11B *5/40*; H05F *1/00, 3/00, 3/02*

U.S. Cl. 361—220 **1 Claim**



1. Apparatus for operating a disk drive so as to prevent an undesirable electrical discharge between a disk drive pole

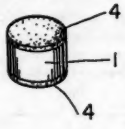
piece and a magnetic disk surface to which it is coupled, said pole piece and said magnetic disk surface being separated by a predetermined distance to effectively form two plates of a parasitic capacitance capable of sustaining said undesirable discharge; said apparatus comprising means for applying a DC voltage to said pole piece, and means for applying a DC voltage to said magnetic disk surface which is approximately equal to said DC voltage applied to said pole piece and thereby prevents said parasitic capacitance between said pole piece and said magnetic disk surface from charging to a level sufficient to sustain any electrical discharge, wherein a single switch may be used to connect at one terminal thereof to an existing voltage supply terminal for a preamplifier stage which is in turn is connected to said pole piece, and said switch is used to connect at another terminal thereof to said magnetic disk surface, whereby a single voltage supply which is existing and available to operationally bias said preamplifier stage may be used multifunctionally to additionally bias said magnetic disk surface through said single switch, thereby ensuring that said pole piece and said magnetic disk surface are biased at substantially the same electrical potential, whereby either random electrical discharge between said disk and pole piece or local discharge between said disk and pole piece into imperfections on said disk surface have been eliminated.

4,987,515

CERAMIC CAPACITOR WITH ELECTRODES FORMED BY REDUCTION

Shouichi Iwaya; Munemitsu Hamada, and Hitoshi Masumura, all of Tokyo, Japan, assignors to TDK Corporation, Tokyo, Japan

Continuation-in-part of Ser. No. 27,380, Mar. 18, 1987, abandoned. This application Nov. 3, 1989, Ser. No. 431,405
Claims priority, application Japan, Jun. 11, 1986, 61-135249
Int. Cl.[5] H01G *4/10, 7/00*
U.S. Cl. 361—321 **8 Claims**



1. A ceramic capacitor, comprising:
a thick core formed of a sintered ceramic material; and
a pair of electrodes formed on opposing end faces of said core, said electrodes being a reduced layer of an oxide formed on the ceramic material of the core.

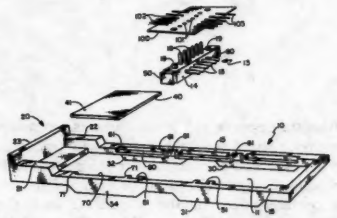
4,987,516

SUBSTRATE CARRIER DEVICE

Thomas D. Belanger, Jr., Clarendon Hills, and Roy L. Johnson, Arlington Heights, both of Ill., assignors to AG Communication Systems Corporation, Phoenix, Ariz.

Filed Dec. 19, 1988, Ser. No. 286,181
Int. Cl.[5] H05K *1/11*
U.S. Cl. 361—413 **6 Claims**

1. A substrate carrier device for mounting and electrically connecting at least one electrical substrate to a pair of substrate guides mounted on a carrier substrate, said carrier substrate including a plurality of electrical connectors connected to a source of electrical signals mounted between said pair of substrate guides, said substrate carrier device comprising:
means for supporting an electrical substrate including a generally planar top surface, a generally planar bottom surface, and an opening extending longitudinally along a central axis of said means for supporting;
means for mounting said substrate carrier device to said substrate guides located along the major perimeter edges of said bottom surface of said means for supporting, said means for mounting arranged to be slidably inserted and accepted within said substrate guides; and
at least one means for making an electrical connection mounted transversely between the major perimeter edges of the top surface of said means for supporting, said means for making an electrical connection having at least a first electrical post extending from said means for making an electrical connection, and at least a second electrical post extending from said means for making an electrical connection, perpendicular to said first electrical post and parallel to said bottom surface, said second electrical post arranged to be accommodated within a respective one of said plurality of electrical connectors, connecting said means for making an electrical connection to said source of electrical signals;
at least a first pair of substrate mounting recesses, each



substrate mounting recesses of said pair of substrate mounting recesses located directly opposite each other on respective major perimeter edges of said means for supporting, proximate said means for making an electrical connection, said first pair of substrate mounting recesses arranged to accept said electrical substrate therebetween; and
flexible circuit means having at least one conductive path extending from an electrically conductive hole to at least a first electrical contact, said first electrical contact extending from a first minor edge of said flexible circuit means, and said electrically conductive hole arranged to be accepted and electrically connected to said first electrical post of said means for making an electrical connection, said first electrical contact arranged to be electrically connected to said electrical substrate connecting said source of electrical signals from said means for making an electrical connection to said electrical substrate.

4,987,517

AFFIXATION OF MOUNTING BRACKETS TO COMPUTER CIRCUIT BOARDS

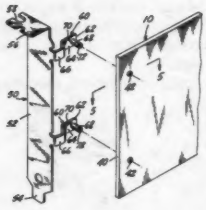
Arthur A. Kurz, Wildlife Run, New Vernon, N.J. 07976

Filed Jul. 3, 1989, Ser. No. 375,130
Int. Cl.[5] H05K *7/02*
U.S. Cl. 361—417 **5 Claims**

1. In the method of affixing a mounting bracket to a computer circuit board, along one edge of the circuit board, the circuit board having a thickness adjacent the one edge and including mounting holes having a given diameter and passing through the thickness of the circuit board adjacent the one edge, the improvement including:
providing the mounting bracket with mounting surfaces, hollow tubular projections projecting from the mounting surfaces at locations corresponding to the locations of the mounting holes, the tubular projections each having opposite ends, an outer diameter generally complementary to the given diameter of the corresponding mounting holes and a length extending from one of the opposite ends, at which one end the corresponding tubular projection is

integral with the mounting bracket at the corresponding mounting surface thereof, to the opposite end, the length being greater than the thickness of the circuit board adjacent the one edge thereof;

inserting the hollow tubular projections into the corresponding mounting holes and extending the tubular projections through the circuit board such that each mounting surface is engaged with the circuit board at the one end of each tubular projection and the opposite end of each tubular projection projects beyond the circuit board;



upsetting the opposite end of each tubular projection toward the circuit board to establish a flanged headed portion at the opposite end of each tubular projection; and

urging each flanged headed portion toward the one end of the corresponding tubular projection until the circuit board is engaged by the mounting surfaces and the flanged headed portions to secure the mounting bracket in place upon the circuit board adjacent the one edge thereof.

4,987,518

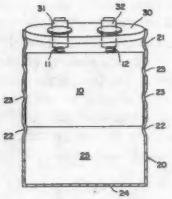
METAL-CASED ELECTROLYTIC CAPACITOR

Lester C. Dain, West Jefferson, N.C., assignor to Sprague Electric Company, North Adams, Mass.

Filed Apr. 11, 1988, Ser. No. 179,695

Int. Cl.[5] H01G *1/02*

U.S. Cl. 361—517 **5 Claims**



1. In a metal-cased electrolytic capacitor, means permitting the utilization of a conventional metal capacitor can of a given length so as to house a capacitance section of a newer and shorter length than said can, said means including a convolutely-wound capacitance section having high capacitance anode foil and cathode foil wound with interleaved spacer material to the same diameter as said can, said section being shorter than said can and being located within said can having a bottom as a housing, said can having at least three circumferential indentations, one of said indentations being uppermost and providing a seat for a cover for final sealing of said capacitor, another of said indentations being lowermost and spaced from said bottom of said can and providing support beneath an end of said section around its circumference thereby limiting said section to extend into aid can only to a fixed predetermined depth, and at least one other of said indentations between said uppermost indentation and said lowermost indentation providing lateral support for and preventing lateral movement of said section.

4,987,519

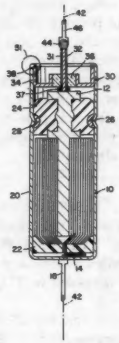
HERMETICALLY SEALED ALUMINUM ELECTROLYTIC CAPACITOR

Clinton E. Hutchins, Pownal, Vt.; Eugene W. Kuzia, Adams, Mass.; Phyllis M. Schmidt, and Walter W. Schroeder, both of Williamstown, Mass., assignors to Sprague Electric Company, North Adams, Mass.

Filed Mar. 26, 1990, Ser. No. 498,781

Int. Cl.[5] H01G *9/10, 7/00*

U.S. Cl. 361—518 **7 Claims**



1. A hermetically sealed aluminum electrolytic capacitor comprising a capacitor section having an aluminum anode and a liquid electrolyte, an aluminum can having one open end and one closed end, said can containing said capacitor section and said electrolyte, a glass-to-metal seal having a tantalum outer ring, said seal snugly fitted into and closing said open end, said tantalum ring being completely sealed to said aluminum can by a continuous annular laser weld.

4,987,520

ELECTRONIC COMPONENT, ELECTROLYTIC CAPACITOR AND METAL HOUSING

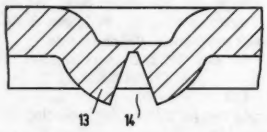
Johannes A. M. Rots, Zwolle, Netherlands, assignor to U.S. Philips Corp., New York, N.Y.

Filed Jul. 14, 1989, Ser. No. 380,161

Claims priority, application Netherlands, Jul. 22, 1988, 8801853

Int. Cl.[5] H01G *9/00*

U.S. Cl. 361—521 **8 Claims**



1. An electronic component comprising an electronic element and a metal housing, which housing is constituted by a sleeve which is closed on at least one end and which has a predominantly flat bottom in which an excess pressure protection means is arranged which is formed by at least one straight notch in the bottom, characterized in that the notch is provided on the outside of the housing and that the bottom has a corrugation which extends parallel or substantially parallel to

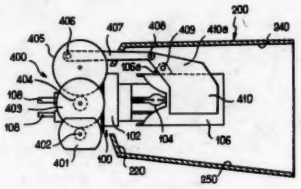
the notch and in that the portion of the corrugation disposed inside the metal housing is free of notches.

4,987,521

MOTOR VEHICLE HEADLIGHT INCLUDING A SINGLE LIGHT SOURCE FOR GENERATING TWO DIFFERENT BEAMS

Hector Fratty, Paris, and Joël Leleve, Epinay sur Seine, both of France, assignors to Valeo Vision, Bobigny Cedex, France

Filed Jan. 22, 1990, Ser. No. 467,860
Claims priority, application France, Jan. 23, 1989, 89 00754
Int. Cl.[5] B60Q *1/00*
U.S. Cl. 362—61 11 Claims



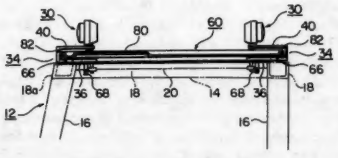
1. A motor vehicle headlight of the type comprising a single light source, a reflector including two zones suitable for generating two different respective light beams, a closure glass, masking means situated in the vicinity of the source and capable of being displaced for selectively masking the light rays delivered by the source and propagating toward at least one of the two zones, said two zones disposed side-by-side, each zone extending over the entire height of the reflector, each zone of the reflector comprising a portion of a reflecting surface capable of generating associated beam, said masking means comprising at least one screen, said screen in its masking position situated to one side of the source, at least one of the two zones of the reflector comprising a surface for generating a beam beneath a cut-off extending generally horizontally, the other zone of the reflector comprising a surface suitable for generating a concentrated beam in the vicinity of the optical axis, and said screen adapted to mask the rays propagating from the source toward the first zone of the reflector and having at least one small orifice therethrough in order to allow a determined quantity of light to pass through said screen toward said first zone.

4,987,522

ILLUMINATION DEVICE AND ROOF MEMBER FOR A FORKLIFT

Takayuki Miyano, and Shinsuke Nii, both of Kariya, Japan, assignors to Kabushiki Kaisha Toyoda Jidoshokki Seisakusho, Kariya, Japan

Filed Dec. 18, 1989, Ser. No. 452,557
Claims priority, application Japan, Dec. 21, 1988, 63-164450; Dec. 23, 1988, 63-165766
Int. Cl.[5] B60Q *1/02*
U.S. Cl. 362—74 7 Claims



1. A combination of an illumination device and a roof member mountable to a ceiling portion of a fork lift, characterized in that the illumination device comprises a light mounting bracket bent into a figure 'C', an end of a lower portion being removably fixable to a crosspiece of said ceiling portion and a light mounted to an end of an upper portion of said light mounting bracket, the illumination device capable of being arranged at a position where the bent portion of said light mounting bracket is along an outermost edge of said ceiling portion; and

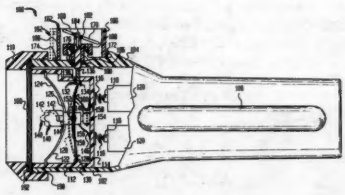
the roof member comprises a drip edge groove formed at a periphery thereof, an upward facing depression formed in a lower part of one portion of said periphery so that the periphery of the roof member can be inserted in between said upper and lower portions of the light mounting bracket of said illumination device when the illumination device is mounted at a fixed position of said ceiling portion, and a mounting means for removably mounting the roof member to the ceiling portion.

4,987,523

ADJUSTABLE BEAM FOCUS FLASHLIGHT

Bruce W. Lindabury, R.D. 3, Box 6, Newton, N.J. 07860, and Ralph J. DeVito, Stanhope, N.J., assignors to Bruce Wayne Lindabury, Newton, N.J.

Filed Feb. 28, 1990, Ser. No. 486,111
Int. Cl.[5] F21L *7/00*
U.S. Cl. 362—188 24 Claims



1. An illumination device having an adjustable beam focus comprising a housing containing a reflector, a lamp bulb and an adjustable beam focus assembly, said assembly including a resilient member arranged adjacent said reflector and supporting said bulb, and flexing means for flexing said resilient member between a first and second state, said flexing means comprising a rotatable cam in contact with a portion of said bulb, the rotation of said cam causing said resilient member to flex to a greater or lesser amount between said first and second states thereby changing the relative position of said bulb to said reflector to adjust the beam focus.

4,987,524

LAMP SHADE WITH IMPROVED OPTICAL EFFICIENCY

Jack V. Miller, 700 N. Auburn Ave., Sierra Madre, Calif. 91024

Filed Oct. 17, 1988, Ser. No. 270,349
Int. Cl.[5] F21V *11/00*
U.S. Cl. 362—355 19 Claims

1. A lamp shade for a light source comprising:

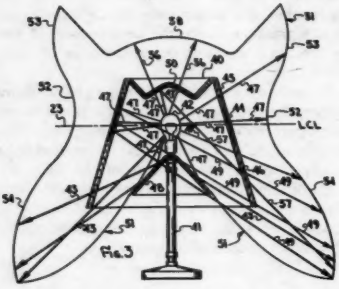
a translucent generally tubular shape and adapted to be disposed about a vertical axis and partially enclosing at least one light source having a centroid of luminance;

a portion of the shade in a horizontal plane generally through the centroid of luminance of the light source and having an optical transmittance through the shade surface;

a portion of the shade extending above the horizontal plane through the centroid of luminance of the light source and having an optical transmittance through the shade surface at least as great as the portion of the shade in the plane of the centroid of luminance of the light source; and

a portion of the shade extending below the horizontal plane

through the centroid of luminance of the light source and having an optical transmittance through the shade surface



greater than the optical transmittance through the portion of the shade in the horizontal plane of the centroid of luminance of the light source.

4,987,525

SWITCHING POWER SUPPLY

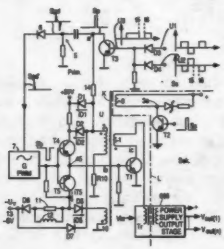
Gerard Rilly, Unterkirnach, and Daniel Lopez, Königsfeld, both of France, assignors to Electronic-Werke Deutschland GmbH, Villingen-Schwenningen, Fed. Rep. of Germany

Filed Mar. 26, 1990, Ser. No. 498,663

Claims priority, application PCT Int'l Appl., Sep. 22, 1988, 88/00857

Int. Cl.[5] H02M *3/335*

U.S. Cl. 363—21 18 Claims



1. A switching power supply, comprising:

a first transformer;

switching means having a main current conducting terminal that is coupled to a first winding of said transformer for generating a periodic first current in said main current conductive terminal that varies when said switching means is conductive and that is transformer-coupled via said transformer;

means responsive to said transformer-coupled first current and coupled to a control terminal of said switching means for generating a control signal at said control terminal that varies when said switching means is conductive, in accordance with the variation of said first current, such that the variation in said control signal compensates in said switching means for the variation in said first current;

a source of a synchronizing signal;

means responsive to said synchronizing signal and coupled to a winding of said transformer for transformer-coupling said synchronizing signal via signal transformer to said control signal generating means to synchronize said control signal; and

means coupled to said first winding and energized by said first current for generating therefrom an output supply voltage.

4,987,526

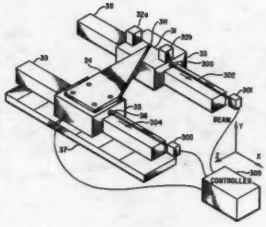
SYSTEM TO PROVIDE HIGH SPEED, HIGH ACCURACY MOTION

Alexander H. Slocum, and Debra Thurston, both of McLean, Va., assignors to Massachusetts Institute of Technology, Cambridge, Mass.

Filed Feb. 2, 1989, Ser. No. 305,741

Int. Cl.[5] G05B *19/19*

U.S. Cl. 364—167.01 21 Claims



18. A device for accurately and efficiently controlling the movement of an item by an actuator that applies force to the item through a flexural transmission, the system comprising:

item sensor means for measuring the position of the item;

actuator sensor means for measuring the position of the actuator; and

control means for receiving data from the item sensor means and the actuator sensor means and for controlling the actuator such that the item is moved quickly and accurately to a desired position,

wherein the actuator means has a desired position corresponding to the desired position of the item, and wherein the control means controls the actuator means by generating signals, referred to as control force commands, indicating how much force is to be applied by the actuator means, the signal corresponding to the largest force that the actuator means is capable of applying being called a maximum force command, and calculates each control force command by repeating the following steps using variables x1, x2, x1desired, x2desired, u1, u1old1, u1old2, u2, u2old1, u2old2, e1, e1old1, e1old2, e2, e2old1, e2old2, a11, a12, a13, a14, a15, a21, a22, a23, a24 and a25, in a series of iterations, including a first iteration and subsequent iterations, each subsequent iteration having a previous iteration, until the item and the actuator means reach their desired positions:

(a) determining e1 by subtracting x1, which represents the current position of the item, from x1desired, which represents the desired position of the item;

(b) determining e2 by subtracting x2, which represents the current position of the actuator mans, from x2desired, which represents the desired position of the actuator means;

(c) determining u1 by finding the sum of the products: (a11*e1), (a12*e1old1), (a13*e1old2), (a14*u1old1), and (a15*u1old2), wherein a11, a12, a13, a14 and a15 are coefficients for a recursive digital control algorithm, and wherein e1old2 equals zero for the first iteration and e1old1 of the previous iteration for subsequent iterations, e1old1 equals zero for the first iteration and e1 of the previous iteration for subsequent iterations, u1old2 equals zero for the first iteration and u1old1 of the previous iteration for subsequent iterations, and u1old1 equals zero for the first iteration and u1 of the previous iteration for subsequent iterations;

(d) reducing u1 to one-half of the maximum force command

if the u1 calculated in step (c) is greater than one-half of the maximum force command;

(e) determining u2 by finding the sum of the products: (a21*e2), (a22*e2old1), (a22*e2old2) (a24*u2old1), and a (25*u2old2), wherein a21, a22, a23, a24 and a25 are coefficients for a recursive digital control algorithm, and wherein e2old2 equals zero for the first iteration and e2old1 of the previous iteration for subsequent iterations, e2old1 equals zero for the first iteration and e2 of the previous iteration for subsequent iterations, u2old2 equals zero for the first iteration and u2old1 of the previous iteration for subsequent iterations, and u2old1 equals zero for the first iteration and u2 of the previous iteration for subsequent iteration;

(f) reducing u2 to one-half of the maximum force command if the u2 calculated in step (e) is greater than one-half of the maximum force command; and

(g) determining the control force command by adding u1 and u2.

4,987,527

PERSPECTIVE DISPLAY DEVICE FOR DISPLAYING AND MANIPULATING 2-D OR 3-D CURSOR, 3-D OBJECT AND ASSOCIATED MARK POSITION

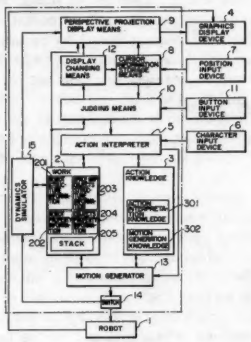
Tomoyuki Hamada; Kohzi Kamezima; Ikuo Takeuchi, all of Ibaraki, and Yuriko Watanabe, Tokyo, all of Japan, assignors to Hitachi, Ltd., Tokyo, Japan

Filed Oct. 24, 1988, Ser. No. 261,498

Claims priority, application Japan, Oct. 26, 1987, 62-268167; Oct. 26, 1987, 62-269833; Oct. 26, 1987, 62-269834

Int. Cl.[5] G05B *19/18, 19/42, 19/405;* **G06F** *3/033*

U.S. Cl. 364—167.01 **8 Claims**



1. In an operation system having a graphic display means for displaying patterns on a screen and operating patterns of objects displayed on the screen, said system comprising:

position input means for producing displacements in directions of X, Y and Z axes in a three-dimensional space;

cursor information storage means for storing three-dimensional position data and shape data of a cursor and rewriting data stored therein response to displacements produced by said input means;

object information storage means for storing three-dimensional position data and shape data of objects and storing position data of a mark which is provided for each object to spatially designate a location of the object;

perspective converting projection display control means for referring to three-dimensional position data and shape data of the cursor stored in said cursor information storage means, converting the three-dimensional position data into converted three-dimensional position data for use in perspective projection of a converted cursor onto said screeen and generating display signals to display the converted cursor at a converted position indicated by the converted three-dimensional position data and with a size corresponding to a converted position on said screen, said projection display control means further refers to the three-dimensional position data and shape data of the objects and the position data of the mark positions stored in said object information storage means, converts the three-dimensional position data and shape data of the objects and the position data of the marks into converted three-dimensional position data and shape data of converted objects and converted position data of converted marks for use in perspective projection of the converted objects and converted marks onto said screen and generating display signals to display respective converted objects and marks at converted positions and with converted shapes and sizes corresponding to the converted positions on said screen, and display signals being outputted to said graphic display means;

means for generating a trigger signal; and

judging means, responsive to the trigger signal, for comparing current three-dimensional position data of said cursor information storage means and current position data of a current mark of said object information storage means in order to detect differences not larger than predetermined values to thereby select an object corresponding to a mark with the detected differences;

wherein said objects are to be operated by a robot; and

said system further including action knowledge having a collection of robot operating steps of said robot; and

action interpretation means for referring to said action knowledge and instructing said object information storage means to display marks respectively provided at only objects able to be selected by said robot per each of said operating steps.

4,987,528

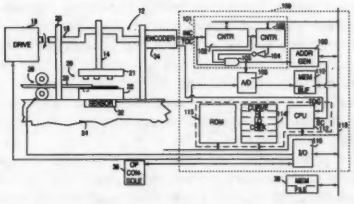
SIGNATURE ANALYSIS CONTROL SYSTEM FOR A STAMPING PRESS

Michael J. O'Brien, Carrollton, Tex., assignor to Johnson Service Company, Milwaukee, Wis.

Continuation of Ser. No. 167,371, Mar. 14, 1988, abandoned. This application Nov. 21, 1989, Ser. No. 442,421

Int. Cl.[5] G06F *15/46;* **G01H** *7/68;* **G05B** *9/02*

U.S. Cl. 364—184 **22 Claims**



1. A method for controlling the operation of a stamping press, said press including a ram adapted to cooperate with a tool for controllably moving through a cycle to generate forces at said tool, the method comprising the steps of:

generating from the drive system of the press, a position signal comprising pulses indicative of a specific angular position of the drive system for said ram during a cycle;

generating a first analog signal indicative of a force associated with said ram;

sampling said first analog signal in response to the pulses of the position signal during a reference ram cycle, and generating a signature array of successive data bytes indicative of instantaneous values of said force and associated position;

generating a first reference array comprising a set of data

bytes, by adding a first set of offset values to said successive data bytes of said signature array;

generating a second reference array comprising a set of data bytes, by subtracting a second set of offset values from successive data bytes of said signature array;

storing said first and second reference arrays;

sampling said first analog signal in response to the pulses of the position signal during a subsequent ram cycle, and generating a current signature array of successive data bytes indicative of instantaneous values of said force and associated position;

comparing the respective bytes of said current signature array with the corresponding bytes of said first and second reference arrays; and

generating control signals for controlling said press in accordance with said comparison.

4,987,529

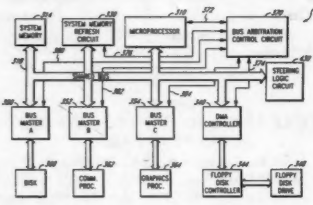
SHARED MEMORY BUS SYSTEM FOR ARBITRATING ACCESS CONTROL AMONG CONTENDING MEMORY REFRESH CIRCUITS, PERIPHERAL CONTROLLERS, AND BUS MASTERS

Thomas W. Craft; Bradley T. Herrin, both of El Toro, and Thomas E. Ludwig, Irvine, all of Calif., assignors to AST Research, Inc., Irvine, Calif.

Filed Aug. 11, 1988, Ser. No. 231,765

Int. Cl.[5] **G06F** *13/12, 13/18, 13/26, 13/36*

U.S. Cl. 364—200 **7 Claims**



1. A bus arbitration control circuit for a computer system having a microprocessor, a system memory and a shared bus between the microprocessor and the system memory, said computer system further including a memory refresh control circuit that uses said shared bus to periodically refresh said system memory and at least first and second peripheral controllers that use said shared bus to transfer data between said system memory and first and second peripheral devices, respectively, said bus arbitration control circuit arbitrating control of said shared bus, said arbitration control circuit comprising:

a first input connected to receive a refresh request signal from said memory refresh control circuit, said memory refresh control circuit activating said refresh request signal when said memory refresh control circuit wants control of said shared bus to refresh said system memory;

a second input connected to receive a first bus request signal from said first peripheral controller, said first peripheral controller activating said first bus request signal when said first peripheral controller wants control of said shared bus to transfer data between said system memory and said first principal device;

a third input connected to receive a second bus request signal from said second peripheral controller, said second peripheral controller activating said second bus request signal when said second peripheral controller wants control of said shared bus to transfer data between said system memory and said second peripheral device;

a first output connected to provide a hold request signal to said microprocessor, said bus arbitration control circuit activating said hold request signal to request said microprocessor to relinquish control of said shared bus;

arbitration relinquishing means to return control of the shared bus back to the microprocessor;

a fourth input connected to receive a hold acknowledge signal from said microprocessor, said microprocessor activating said hold acknowledge signal to inform said bus arbitration control circuit that said microprocessor has relinquished control of said shared bus;

a second output connected to provide a refresh grant signal to said memory refresh control circuit, said bus arbitration control circuit activating said refresh grant signal to inform said memory refresh control circuit that it has control of the shared bus;

a third output connected to provide a first bus grant signal to said first peripheral controller, said bus arbitration control circuit activating said first bus grant signal to inform said first peripheral controller that it has control of the shared bus;

a fourth output connected to provide a second bus grant signal to said second peripheral controller, said bus arbitration control circuit activating said second bus grant signal to inform said second peripheral controller that it has control of the shared bus; and

a logic sequencer that monitors said refresh request signal, said first bus request signal, said second bus request signal and said hold knowledge signal on said first, second, third and fourth inputs, respectively, and that generates said active hold request signal, said refresh grant signal, said first bus grant signal and said second bus grant signal on said first, second third and fourth outputs, respectively,

said logic sequencer responsive to active refresh request, first bus request and second bus request signals to activate said hold request signal to request said microprocessor to relinquish control of said shared bus,

said logic sequencer responsive to an active hold acknowledge signal from said microprocessor when said memory refresh circuit is maintaining an active refresh request signal to activate said refresh grant signal to grant control of said shared bus to said memory refresh circuit,

said logic sequencer responsive to an active hold acknowledge signal from said microprocessor when said first and second peripheral controllers are maintaining active first and second bus request signals and said memory refresh circuit is maintaining an inactive refresh signal to activate a selected one of said first and second bus grant signals to grant control of said shared bus to a respective one of said first and second peripheral controllers, said logic sequencer arbitrating priority between said first and second bus request signals to determine which bus grant signal to activate, and

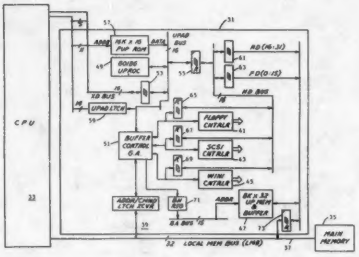
said logic sequencer responsive to an active refresh request signal when said one of said first and second peripheral controllers has control of said shared bus to deactivate said selected one of first and second bus grant signals to cause said respective one of said first and second peripheral controllers to relinquish control of said shared bus and to activate said refresh grant signal to grant control of said shared bus to said memory refresh circuit, said logic sequencer further responsive to the deactivation of said refresh request signal to deactivate said refresh grant signal and to activate said selected one of said first and second bus grant signals to automatically return control of said shared bus back to said respective one of said first and second peripheral controllers without arbitrating priority between said first and second bus request signals while maintaining an active hold request signal to preclude said microprocessor from regaining control of said shared bus.

4,987,530

INPUT/OUTPUT CONTROLLER FOR A DATA PROCESSING SYSTEM

Eric M. Wagner, E. Douglas; Martin Kiernicki, Natick, and John L. Freeman, Hopkinton, all of Mass., assignors to Data General Corp., Westboro, Mass.

Filed Nov. 15, 1985, Ser. No. 798,560
Int. Cl.[5] G06F 9/06
U.S. Cl. 364—200 2 Claims



1. A data processing system comprising:
a. a local memory bus,
b. a central processing unit connected to said local memory bus,
c. a main memory section connected to said local memory bus, and
d. a subsystem for connecting said data processing system to a plurality of input/output devices, said subsystem comprising:
i. a plurality of input/output device controllers,
ii. a single microprocessor for controlling the operations of said subsystem,
iii. a buffer RAM for storing a program for operating said single microprocessor,
iv. a gate array for interfacing said input/output device controllers to said main memory section and managing the flow of data between said input/output device controllers, said microprocessor, said main memory section and said buffer RAM, subsystem further includes:
v. a host microcode data transceiver for transmitting data between the subsystem and the CPU,
vi. a buffer RAM data transceiver for transmitting data between the buffer RAM and the microprocessor section,
vii. a power up PROM for holding an initialization program for the subsystem,
viii. an address latch for holdling the valid address for accessing the host microcode data transceiver, and
ix. a pair of buffer RAMS.

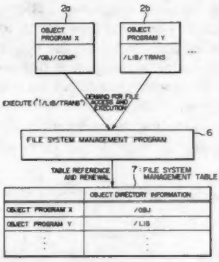
4,987,531

FILE SYSTEM MANAGEMENT METHOD AND FILE MANAGEMENT SYSTEM

Takashi Nishikado, Ebina; Megumu Kondo, Kawasaki, and Fumiya Murata, Hadano, all of Japan, assignors to Hitachi, Ltd., Tokyo, Japan

Filed May 18, 1988, Ser. No. 195,289
Claims priority, application Japan, May 20, 1987, 62-121245
Int. Cl.[5] G06F 9/00
U.S. Cl. 364—200 4 Claims

1. A file management method implemented by a computer for executing one program of a plurality of object programs in response to an executing-command instructing to execute said one program from another program, said executing-command including a relative-path being expressed in said another program by using a unified directory symbol and a file name of an object file having said one program being executed as a subroutine program of said another program, said file management method comprising:
a first step of extracting directory information from a first executing-command inputted by a user, said first executing-command specifying an absolute-path including a first file name of a first object file having a first object program which said user demands to execute and directory information including a second file name of a directory file specifying said first object file, said first object file and said directory file specifying said first object file constituting a set of tree structured files;
a second step of storing said directory information extracted in said first step and corresponding to said first file name in memory;
a third step of judging, in response to a second executing-command instructing to execute a second object program



from said first object program, whether or not said second executing-command includes said relative-path expressed by using said unified directory symbol and a third file name of a second object file having said second object program by detecting said unified directory symbol in said second executing-command;
a fourth step of exchanging said relative-path included in said second executing-command into an absolute-path for specifying said second object file if it was judged that said second executing-command included said relative-path in said third step, by replacing said unified directory symbol with said stored directory information corresponding to said first object file in said memory; and
a fifth step of executing said second object program as a sub-routine program of said first object program by using said absolute-path exchanged in said fourth step.

4,987,532

ELECTRONIC COMPUTER SYSTEM WITH MEANS FOR ISSUING A NON-STORE REQUEST BEFORE EXECUTING STATE TRANSITION PROSECUTION

Takayuki Noguchi, Tokyo, Japan, assignor to NEC Corporation, Tokyo, Japan

Filed May 31, 1989, Ser. No. 358,805
Claims priority, application Japan, May 31, 1988, 63-134843
Int. Cl.[5] G06F 9/22
U.S. Cl. 364—200 3 Claims

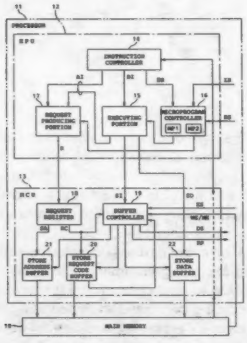
1. In an electronic computer system comprising:
a main memory for storing a plurality of programs and data;
a processor for processing said programs, each of said programs comprising a succession of instructions, said succession of instructions including a specific instruction which has a state transition prosecution requiring cancellation of a checkpoint;
instruction controlling means for fetching selected instructions and for delivering each of said fetched instructions as a delivered instruction and an execution request for said delivered instruction;
executing means for executing said delivered instruction

according to microsteps of a microprogram of a microprogram control means to produce a succession of store data units as data signals and a succession of corresponding store indications;

store request producing means, coupled to said executing means and to said microprogram control means, for producing a succession of store requests as request signals corresponding to said succession of store data units as data signals according to said microsteps of said microprogram; and

main memory control means, coupled to said executing means, to said store request producing means and to said main memory, for successively buffering said request signals as buffered request signals and for buffering said data signals as buffered data signals in response to said store indications, said main memory control means responsive to write enabling signals from said main memory for successively delivering said buffered request signal together with said buffered data signals to said main memory as delivered request signals and delivered data signals, said main memory writing said delivered data signals thereinto according to said delivered request signals;

said microprogram control means responsive to an execution request for establishing a checkpoint at a start point of said



microprogram so as to enable said executing means to retry said delivered instruction from said checkpoint when an error occurs during execution of said delivered instruction, said microprogram control means causing said executing means to execute state transition prosecution on occurrence of an instruction requiring state transition prosecution during execution of said delivered instruction; wherein

said microprogram control means comprises state transition prosecution control means, responsive to occurrence of said state transition prosecution, for producing a first indication for producing a non-store request as one of said request signals and a second indication for producing an imitative store data unit as one of said data signals before causing said executing means to execute said state transition prosecution;

said store request producing means and said executing means producing said non-store request and said imitative store data unit in response to said first and said second indications, respectively; and

said main memory rejecting writing said imitative store data unit, in said delivered data signals, when a corresponding one of said delivered request signals is said non-store request.

4,987,533

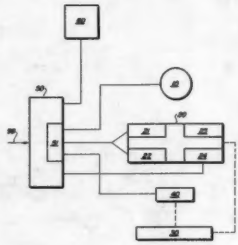
METHOD OF MANAGING DATA IN A DATA STORAGE HIERARCHY AND A DATA STORAGE HIERARCHY THEREFOR WITH REMOVAL OF THE LEAST RECENTLY MOUNTED MEDIUM

Connie M. Clark; Warren B. Harding, and Horace T. S. Tang, all of Tucson, Ariz., assignors to International Business Machines Corporation, Armonk, N.Y.

Filed May 5, 1988, Ser. No. 190,739

Int. Cl.[5] G11B *7/00. 11/00*

U.S. Cl. 364—200 **15 Claims**



1. A data storage hierarchy connected to a host processor wherein a system operator monitors commands from said host processor comprising:

a data storage media library connected to the host processor, said data storage media library including data storage media, a device for writing data to and reading data from data storage media mounted thereon, a plurality of media storage cells, and means for transferring said data storage media between said device and said media storage cells;

other data storage media storage means for receiving data storage media from said data storage media library, the data storage being transferred by said system operator; and

said host processor identifying the least recently mounted data storage medium and commanding the transfer, from said data storage media library to said other data storage media storage means, only of the data storage medium least recently mounted on said device;

whereby if the data storage media library does not have the required storage capacity, the data storage medium in the library which was least recently mounted is removed from the library and another data storage medium may then be inserted.

4,987,534

PROCESSOR HAVING SYNCHRONIZED OPERATION BETWEEN A CPU AND A VECTOR PROCESSOR

Sunao Sekiguchi, Tokyo, Japan, assignor to NEC Corporation, Tokyo, Japan

Continuation of Ser. No. 87,299, Aug. 20, 1987, abandoned. This application Jul. 17, 1989, Ser. No. 380,733

Claims priority, application Japan, Aug. 20, 1986, 61-195080; Sep. 19, 1986, 61-221115

Int. Cl.[5] G06F *13/00*

U.S. Cl. 364—200 **5 Claims**

3. A processor which processes a sequential series of instructions, said processor comprising:

a CPU processing an N-th instruction, where N represents a position of said N-th instruction in said sequential series of instructions;

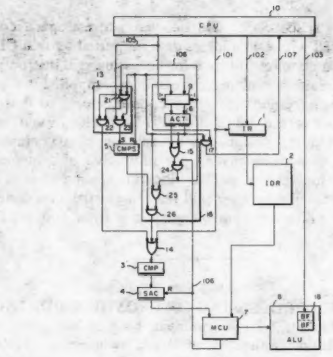
indicator means, coupled to said CPU and responsive to an instruction load signal from said CPU, for generating a first signal when said indicator means is actuated, said first signal taking a first level when an instruction of said sequential series of instructions is stored into an instruction storage unit which is coupled to said CPU;

logical operation means, coupled to said CPU, for executing an operation in accordance with an M-th instruction, in parallel with execution in said CPU, where M represents a position of said M-th instruction in said sequential series of instructions;

counter means, coupled to said CPU and to said logical operation means, for indicating a difference between N and M at a given instant in time, said counter means storing a counter value which increases in response to a processing start instruction from said CPU and decreases in response to completion of an operation by said logical operation means;

execution restraining signal generator means, coupled to said CPU and to said counter means and responsive to a prescribed count value of said counter means, for generating a restraining signal for restraining execution of instructions from said sequential series of instructions by said CPU and for transmitting said restraining signal to said CPU;

flag means, coupled to said CPU and to said indicator means and set in response to said processing start instruction from said CPU, for actuating said indicator means when said flag means is set;



decision means, coupled to said CPU, to said indicator means, to said counter means, and to said flag means, for determining, in accordance with an increase of said count value of said counter means to said prescribed count value in response to said processing start instruction from said CPU, whether or not said execution by CPU is restrained and, if execution is not restrained, actuating said indicator means in response to said processing start instruction from said CPU irregardless of whether said flag means is set;

start instruction means, coupled to said indicator means and to said logical operation means and responsive to said first signal, for starting processing by said logical operation means; and

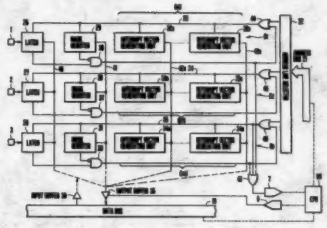
detector means, coupled to said indicator means, to said logical operation means, to said counter means, and to said flag means, for detecting, when said flag means is in a set state and said restraining signal has been generated from said execution restraining signal generator means, that a count value of said counter means has decreased, wherein generation of said restraining signal from said execution restraining signal generator means is thereafter prevented and for actuating said indicator means at a next clock cycle in response to completion of operation of said logical operation means.

4,987,535

INTERRUPTION CONTROL CIRCUIT

Shigeru Takayama, Tokyo, Japan, assignor to NEC Corporation, Tokyo, Japan

Continuation of Ser. No. 749,690, Jun. 28, 1985, abandoned. This application Jan. 17, 1989, Ser. No. 298,289
Claims priority, application Japan, Jul. 5, 1984, 59-139618
Int. Cl.[5] G06F 7/00
U.S. Cl. 364—200 **1 Claim**



1. An interruption control circuit for transmitting interruption information to a CPU via a bus, comprising:

a plurality of input terminals, each of which receives an interruption request signal from a corresponding one of a plurality of interruption requests sources;

a plurality of storage means corresponding to said input terminals respectively, each of which stores interruption vector information corresponding to each of the interruption request sources and includes a selection terminal and an output terminal to read out the stored interruption vector information therefrom to said output terminal in response to a supply of a selection signal to said selection terminal;

a single output buffer means having an input terminal commonly connected to the output terminal of each of said plural storage means and an output terminal connected to the bus, for transmitting the interruption vector information supplied to its input terminal to the bus in response to an interruption acknowledge signal given from the CPU;

a detection means connected to said plural input terminals for detecting the input terminal which has received the corresponding interruption request signal and for generating a detection signal representing that input terminal;

first means connected to said detection means and the selection terminals of said plurality of storage means for supplying said detection signal, as said selection signal, to the selection terminal of the storage means corresponding to said input terminal which has received said corresponding interruption request signal; and

second means connected to said detection means for generating an interruption request to the CPU in response to said detection signal, the CPU generating said interruption acknowledge signal when the CPU accepts said interruption request from said second means for supplying said interruption acknowledge signal to said single output buffer,

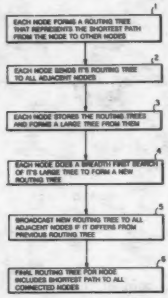
whereby the interruption vector information stored in said storage means corresponding to said input terminal which has received said corresponding interruption request signal, is read out therefrom and supplied to the input terminal of said single output buffer means before the CPU generates a first interruption acknowledge signal following said interruption request, and the single output buffer immediately transmits the read-out interruption vector information onto the bus in response to said interruption acknowledge signal supplied from the CPU.

4,987,536

COMMUNICATION SYSTEM FOR SENDING AN IDENTICAL ROUTING TREE TO ALL CONNECTED NODES TO ESTABLISH A SHORTEST ROUTE AND TRANSMITTING MESSAGES THEREAFTER

Pierre A. Humblet, Cambridge, Mass., assignor to Codex Corporation, Mansfield, Mass.

Filed May 12, 1988, Ser. No. 193,391
Int. Cl.[5] G06F *13/38*
U.S. Cl. 364—200 15 Claims


EACH NODE FORMS A ROUTING TREE THAT REPRESENTS THE SHORTEST PATH FROM THE NODE TO OTHER NODES
EACH NODE SENDS IT'S ROUTING TREE TO ALL ADJACENT NODES
EACH NODE STORES THE ROUTING TREES AND FORMS A LARGE TREE FROM THEM
EACH NODE DOES A BREADTH FIRST SEARCH OF IT'S LARGE TREE TO FORM A NEW ROUTING TREE
BROADCAST NEW ROUTING TREE TO ALL ADJACENT NODES IF IT DIFFERS FROM PREVIOUS ROUTING TREE
FINAL ROUTING TREE FOR NODE INCLUDES SHORTEST PATH TO ALL CONNECTED NODES

1. In a communications network in which a plurality of nodes having unique identities transmit messages over links that have lengths between the nodes, a machine implemented method for sending massages from a first node to a destination node over a shortest path from the first node to the destination node, comprising the steps of:

forming a first routing tree for said first node that represents an estimated shortest path from said first node to other nodes and that includes all nodes that are connected by a link to said first node, one node in said first routing tree serving as a root of said first routing tree,

sending, by said first node, an identical tree to all said nodes that are connected by a link to said first node, said identical tree comprising at least a portion of said first routing tree: receiving, by said first node, respective routing trees transmitted by said nodes that are connected by a link to said first node; and storing, by said first node, the received routing trees,

forming a new routing tree for said first node using said received routing trees, said new routing tree including a group of said nodes one of which is said destination node,

comparing said new routing tree to a previous routing tree at said first node and, if said trees are different, determining a subsequent new routing tree that is not different from said previous routing tree, whereby said subsequent new routing tree defines the shortest paths from said first node to all of said nodes in said group, and

transmitting messages from said first node to said destination node over the shortest path for said destination node defined by said new routing tree.

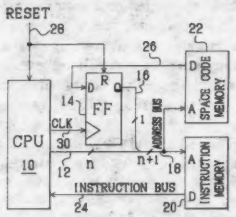
4,987,537

COMPUTER CAPABLE OF ACCESSING A MEMORY BY SUPPLYING AN ADDRESS HAVING A LENGTH SHORTER THAN THAT OF A REQUIRED ADDRESS FOR THE MEMORY

Kazuhide Kawata, Tokyo, Japan, assignor to NEC Corporation, Tokyo, Japan

Filed May 31, 1988, Ser. No. 200,207
Claims priority, application Japan, May 31, 1987, 62-137489
Int. Cl.[5] G06F *12/02*
U.S. Cl. 364—200 4 Claims

1. A computer comprising an instruction memory storing therein instruction codes an having its entire memory region divided into a plurality of non-overlapping memory address spaces, a CPU receiving a received instruction code read out of said instruction memory for executing said received instruction code and outputting to said instruction memory address data for an instruction code to be executed next after said received instruction code, said address data being composed to designate one memory location included in each of said memory address spaces, a space code memory storing respective address space codes each indicative of one of said address spaces within said instruction memory, and delay means for delaying said address space code outputted by said space code memory by one instruction execution time to produce a delayed address space code, said delayed address space code being combined with said address data outputted by said CPU so as to form a complete address for accessing said instruction memory and said complete address being supplied to said instruction memory and said space code memory, so that an instruction code is read out to said CPU from a location of said instruction memory designated by said supplied complete address, and an address space code indicative of a memory address space including a memory location storing an instruction to be executed next after said read-out instruction code is read out from said space code memory so as to be outputted to said delay means.

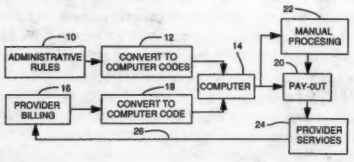


4,987,538

AUTOMATED PROCESSING OF PROVIDER BILLINGS

Danny L. Johnson; John R. Sollman, both of Silverton, and Larry A. Harker, Salem, all of Oreg., assignors to Western Medical Consultants, Portland, Oreg.

Filed Apr. 27, 1989, Ser. No. 344,768
Int. Cl.[5] G06F *15/22*
U.S. Cl. 364—401 6 Claims



1. A method for insurance company processing of provider billings for determining an allowable payment for services rendered by the provider to a member of a group of individuals insured by the insurance company, which method comprises;

identifying a complexity of rules including basic rules applicable to occurrences encountered by a member of the group generating a need for provider services, and further including rules modifying the basic rules applicable to variations in the services provided by the provider;

converting the rules into computer readable computable data;

generating a computer program including the data representing the rules and including process steps for scanning the data to determine applicability of the rules represented

by the data, said program responsive to specific input codes representing a claim of a member of the group, a qualified provided and the services provided;

inputting the computer program into a computer;

receiving manually prepared provider billings having provided billing information including identification of a claim of a member, the provider, and the services rendered, and manually inputting that information to the computer in the form of said specific input codes; and

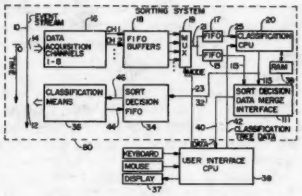
computer processing the information by application of the computer program to thereby apply the rules to the provider billing information and determine from the information the allowable payment permitted by the rules.

4,987,539

APPARATUS AND METHOD FOR MULTIDIMENSIONAL CHARACTERIZATION OF OBJECTS IN REAL TIME

Wayne A. Moore, San Francisco; Tom Nozaki, Jr., Palo Alto; David R. Parks, San Francisco; Richard T. Stovel, and Gary Breitbard, both of Palo Alto, all of Calif., assignors to Stanford University, Stanford, Calif.

Filed Aug. 5, 1987, Ser. No. 82,254
Int. Cl.[5] G06F *15/42*
U.S. Cl. 364—413.08 **35 Claims**



1. An apparatus for making classification decisions in real time comprising:

means for gathering and buffering digital data in multidimensional space having greater than three dimensions describing the characteristics of one or more events including FIFO storage means for storing said digital data in first-in-first-out order along with an event number for use in correlating said data from each said dimension from the same event; and

means for comparing selectable dimensions of said data in real time to a binary classification tree and for making a classification decision in real time based upon said comparison; and

means coupled to said means for comparing for receiving and storing said classification decision until such time as an event is to be sorted and then for using said classification decision to sort the event in real time to which said classification decision applies into the proper category.

10. A method of sorting objects comprising the steps of:

gathering light scatter and fluorescence data in a multidimensional space having more than three dimensions by passing said objects through one or more laser beams and collecting scattered and fluorescent light using a plurality of detectors and an event detector coupled to one of said detectors to generate an event signal and a plurality of signal conditioning channels, each said channel including a sample and hold circuit and a FIFO buffer, with each said channel coupled to one of said detectors, by generating a sample signal using said event detector and delaying said sample signal a selectable delay interval for each said channel, the amount of delay for each channel being selected to correspond to the time delay from the time an event is detected at the detector to which said event detector is coupled to the time when the signal peak occurs in the signal corresponding to the same event as detected by a detector coupled to that channel, and for coupling said peak in said signal using said sample and hold circuit as triggered by said delayed sample signal, and converting the sampled signal value to digital data, and storing all said digital data corresponding to a particular event in the same relative position in all said FIFO buffers in said plurality of channels along with data indicating the event to which each piece of digital data in said FIFO buffers corresponds;

resynchronizing all said digital data corresponding to a particular event by retrieving all said data corresponding to a particular event from the same relative locations in said FIFO buffers and comparing said light scatter and fluorescence data in real time to a binary classification tree having node values which define the various classes of events to be separated and making a sort decision in real time regarding substantially all events; and

using said sort decisions to sort said objects in real time.

29. A method for classifying events in real time comprising the steps of:

asynchronously, electronically gathering a plurality of data about an event, said data defining a multidimensional space having more than three dimensions;

resynchronizing said asynchronously gathered data by storing said data in a plurality of first-in-first-out buffers, one such buffer being dedicated to each dimension of the multidimensional space such that all said data pertaining to a single event in said multidimensional space can be retrieved at substantially the same time when said event is to be classified;

reading data about said event out of said first-in-first-out buffers and comparing said data in real time to data organized in the form of a binary classification tree;

formulating in real time a classification decision based upon the results of the comparison against said binary classification tree;

storing the classification decision in a buffer such that said classification decision can be retrieved later when said classification decision is needed to take action regarding the event to which it pertains; and

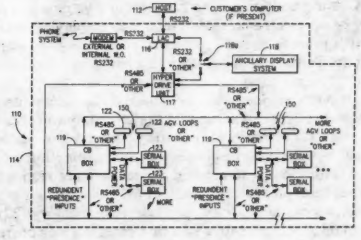
retrieving in real time the classification decision regarding a particular event to be acted upon, and taking the action specified in the classification decision in real time.

4,987,540

AUTOMATIC GUIDED VEHICLE SYSTEM HAVING COMMUNICATION AND TRAFFIC CONTROLLER WITH UNGUIDED PATHS

Walter Luke, Jr., Binghamton, N.Y., assignor to WHS Robotics, Inc., Binghamton, N.Y.

Filed May 30, 1989, Ser. No. 358,234
Int. Cl.[5] G06F *15/48*
U.S. Cl. 364—424.02 **12 Claims**



1. A system for allowing an automatic guided vehicle (AGV) to move from a first guided area to a second guided area across an unguided span therebetween, comprising:

(a) a first guidance means associated with a first guided area;
(b) a second guidance means associated with a second guided area, said second guidance means being displaced a predetermined distance from said first guidance means, said predetermined distance defining an unguided span;
(c) at least one communications and traffic control means including a high speed communications processor means operatively connected to each of said first and second guidance means for facilitating communications between said first and second guidance means in accordance with a predetermined protocol;
(d) means operatively connected to said communications and traffic control means for signalling when an AGV is leaving said first guided area;
(e) means operatively connected to said communications and traffic control means for signalling when an AGV is entering said second guided area;
(f) master control means operatively connected to at least one of said communications and traffic control means for facilitating communications between a plurality of communications and traffic control means; and
(g) a local area controller operatively connected to said master control means, said master control means facilitating communications between said local area controller and said at least one of said communications and traffic control means.

4,987,541

METHOD FOR STORING RUN DATA OF A VEHICLE IN THE MEMORY OF AN ELECTRONIC TACHOGRAPH AND APPARATUS FOR CARRYING OUT THE METHOD

Székely Levente, Sisak u. 5., H-1209 Budapest; Rácz Gábor, Fillér u.1., H-1024 Budapest, and Otta Károlyné, Népszínház u. 17., H-1081 Budapest, all of Hungary

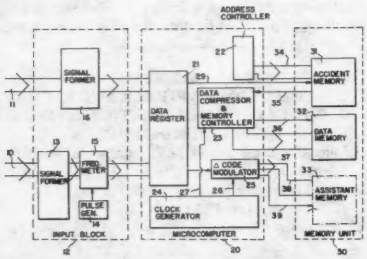
PCT No. PCT/HU87/00061, § 371 Date Jun. 28, 1989, § 102(e) Date Jun. 28, 1989, PCT Pub. No. WO88/05196, PCT Pub. Date Jul. 14, 1988

PCT Filed Dec. 29, 1987, Ser. No. 381,687

Claims priority, application Hungary, Dec. 29, 1986, 5495/86

Int. Cl.[5] G06F *13/00*

U.S. Cl. 364—424.04 **7 Claims**



1. A method for storing run data of a vehicle in a data memory of an electronic tachograph and displaying said run data with a predetermined resolution, comprising the steps of sensing the movement of the vehicle, providing digital distance and velocity data from signals of the sensing step proportional to the travel distance of the vehicle and the instantaneous velocity, respectively, reading said digital data into successive cells of said data memory (32) of the tachograph in predetermined regular periods corresponding to a first sampling rate defining said resolution, wherein said digital data are read into successive cells of an accident memory (31) which has a substantially smaller storage capacity than said data memory (32) at a rate substantially higher than said first sampling rate corresponding to regular intervals of distance traveled, determining the maximum and minimum values of the velocity and the value of said distance during each of said predetermined regular periods, and in said step of reading into the data memory (32) at least said minimum and maximum values of the velocity data and the distance value are stored, shifting forward the contents of the accident memory (31) at said rate corresponding to said regular intervals of distance traveled and shifting forward the content of the data memory (32) at said first sampling rate.

4,987,542

ARRANGEMENT FOR DETERMINING THE EFFECTS OF CROSS WINDS ON VEHICLES

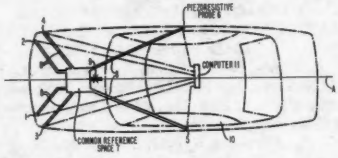
Van T. Tran, Stuttgart, Fed. Rep. of Germany, assignor to Daimler-Benz AG, Fed. Rep. of Germany

Filed May 11, 1989, Ser. No. 350,348

Claims priority, application Fed. Rep. of Germany, May 11, 1988, 3816057

Int. Cl.[5] B62D *5/00*

U.S. Cl. 364—424.05 **12 Claims**



WHAT IS CLAIMED:

1. An arrangement for determining effects of cross winds on a vehicle having a plurality pressure probes spaced from one another in a longitudinal direction of the vehicle and arranged symmetrically with respect to a vertical central plane of the vehicle for generating pressure signals representative of a pressure on a body of the vehicle at a pressure probe location comprising:

cross wind direction signal generating means for generating a wind direction signal representative of a wind direction of a cross wind relative to the vehicle, the wind direction signal being a ratio of a first difference value between pressure signals generated by a first pressure probe on a first side of the vehicle and pressure signals generated by a second pressure probe arranged asymmetrically with respect to the first pressure probe on a second side of the vehicle and a second difference value between pressure signals generated by third and fourth pressure probes which are arranged symmetrically with respect to the first and second pressure probes; and

ram pressure signal generating means for generating a ram pressure signal representative of a ram pressure of the cross wind on the vehicle, the ram pressure signal being determined from a difference value between pressure signals generated by two pressure probes arranged asymmetrically with respect to the vertical central plane of the vehicle at different sides of the vehicle as a function of at least one of an empirically determined coefficient and said wind direction signal.

4,987,543

WHEEL SPIN CONTROL SYSTEM

James A. Wood, Spartanburg, and Richard J. Mazur, Greer, both of S.C., assignors to American Standard Inc., Spartanburg, S.C.

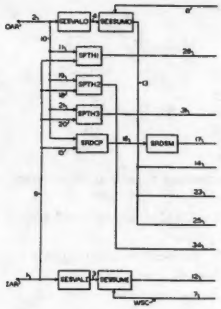
Filed Feb. 21, 1989, Ser. No. 312,837

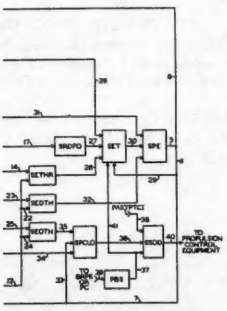
Int. Cl.[5] B60T *8/00*

U.S. Cl. 364—426.03 **15 Claims**

1. An energy storage wheel spin propulsion control system for a vehicle comprising, spin energy storage value means responsive to an axle rate signal of each axle for producing a logical output signal, spin energy storage sum means for causing a summing, subtracting and resetting of the logical output signals produced by the spin energy storage value means, first spin threshold means for producing a first logic signal when the axle rate signal of either one of the axles is ≧ a first predetermined axle rate, spin energy threshold means for producing a first logic signal when one of the logical output signals of said spin energy storage sum means is ≧ a first logical output signal, spin rate difference comparison means for comparing the axle rate signal of each axle so that if the axle rate signal of each of the axles is greater than a second predetermined axle rate and the axle rate signal of one of the axles is greater than a third predetermined axle rate a first logic signal is produced

and if not a second logic signal is produced, spin rate difference sum means for summing the first logic signal and the second logic signal of said spin rate difference comparison means, spin rate difference final output means for producing a first logic signal if the total of the first logic signals of said spin rate difference sum means is equal to a given value, second spin threshold means for producing a first logic signal when the axle rate signal of either one of the axles is ≦ a fourth predetermined axle rate, third spin threshold means for producing a first logic signal when the axle rate signal of either one of the axles is ≦ a fifth predetermined axle rate, spin energy dissipation threshold means for producing a first logic signal when one of the logical output signals of said spin energy storage sum means is ≦ a second logical output signal, spin energy optimization threshold means for producing a first logic signal when one of the logical output signals of said spin energy storage sum means is ≦ a third logical output signal, spin enable timer means responsive to a transition from a second logic signal to a first logic signal, said first spin threshold





means, said spin energy threshold means and said spin rate difference final output means for producing a first logic signal for a given time period and for producing a second logic signal upon expiration of the given time period and when a spin enable means undergoes a transition from a first logic signal to a second logic signal, said spin enable means receiving said first logic signal and said second logic signal from said spin enable timer means, said spin energy dissipation threshold means and said third spin threshold means for producing a first logic signal and a second logic signal, spin control logic output means responsive to said first logic signal and to said second logic signal received from said spin enable means, said second spin threshold means and said spin energy optimization threshold means for producing one of three spin control output signals, and slip-spin output determination means for receiving an input from each of the power-brake signal means, slip interface means and said spin control logic output means for producing either a full, a reduce or a hold tractive effort output command signal.

4,987,544

ENGINE CONTROL DEVICE FOR REDUCING THE PROCESSING TIME OF CONTROL VARIABLES

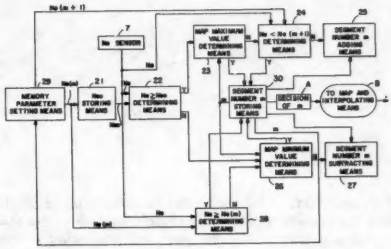
Satoshi Honda, Shiki; Sumitaka Ogawa, Oomiya, and Tatsuo Hayasi, Kawagoe, all of Japan, assignors to Honda Giken Kogyo Kabushiki Kaisha, Tokyo, Japan

Filed Sep. 19, 1989, Ser. No. 409,422

Claims priority, application Japan, Sep. 19, 1988, 63-234216

Int. Cl.[5] **G06F** *15/48, 15/50;* **F02M** *51/00*

U.S. Cl. 364—431.05 **22 Claims**



1. A method of controlling fuel injection in an engine comprising the steps of:

(a) sensing at least one engine operating condition to develop a sensed value of a control parameter;

(b) storing a control map having a plurality of fuel injection quantities which are addressed by a plurality of memory access parameters, each of said memory access parameters corresponding to adjacent ranges of possible values of said control parameters being defined by sequential segment numbers, each said memory access parameter having a segment value within the range of possible values of said control parameter defined thereby;

(c) selecting an initial memory access parameter defined by a segment number;

(d) comparing the sensed value of said control parameter to said range of values corresponding to said initial memory access parameter defined by said segment number and determining whether said sensed value is greater than, less than or within said range of values corresponding to said initial memory access parameter;

(e) selecting said initial memory access parameter as a selected memory access parameter to access said control map when said sensed value is within the range of values corresponding to said initial memory access parameter;

(f) updating said memory access parameter by incrementing or decrementing said segment number when said initial memory access parameter is determined in said step to be greater than or less than said range of values;

(g) repeating said steps (d)–(f) until said step (e) selects said initial memory access parameter as said selected memory access parameter;

(h) accessing a fuel injection quantity from said control map by addressing said map with said selected memory access parameter; and

(i) injecting fuel of a quantity selected by said step (h) into said engine.

4,987,545

METHOD FOR MONITORING THE MANUFACTURE OF A PRODUCT

Ingegerd Dirtoft, Eriksbergsgatan 38, S-114 30 Stockholm, Sweden

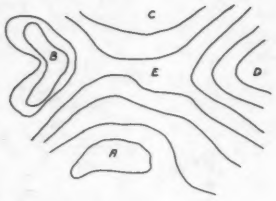
PCT No. PCT/SE87/00232, § 371 Date Nov. 2, 1988, § 102(e) Date Nov. 2, 1988, PCT Pub. No. WO87/07363, PCT Pub. Date Dec. 3, 1987

PCT Filed May 12, 1987, Ser. No. 267,467

Claims priority, application Sweden, May 20, 1986, 8602266

Int. Cl.[5] G01B *9/02*

U.S. Cl. 364—468 3 Claims



1. A method for monitoring the manufacture of a product to detect the possible occurrence of deformation in the shape of the product, comprising the steps of: producing a series of holographic images of the product under manufacture at predetermined, spaced time intervals (Δt, $2\Delta t$, etc.) such that said images, at successive imaging time points ($t_o+\Delta t$, $t_o+2\Delta t$....) are representative of deformations occurring in the shape of the product relative to respective immediately preceding imaging time points (t_o, $t_o+\Delta t$....); determining, from the images thus produced, the rate of change of said deformations; and extrapolating determined values relating to the rate of change of deformations to obtain an estimation of a final shape of the product in relation to the shape of said product immediately following its manufacture.

4,987,546

METHOD AND CIRCUIT FOR CONTROLLING THE SPEED OF AN OBJECT MOVEABLE BY A DRIVE

Knud Blohm, and Steen Hornsleth, both of Nordborg, Denmark, assignors to Danfoss A/S, Nordborg, Denmark

Filed Jun. 30, 1989, Ser. No. 374,139

Claims priority, application Fed. Rep. of Germany, Jul. 9, 1988, 3823304

Int. Cl.[5] G05B *19/28*

U.S. Cl. 364—474.3 4 Claims

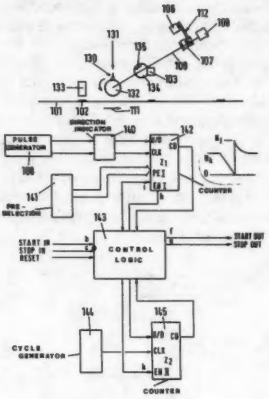
1. A method for controlling the starting and stopping of a moveable object in a system wherein (a) said moveable object is driven by a constantly running motor which is subject to variations in speed, (b) clutch-brake means disposed between said object and said motor is operable to join said motor and said object for said starting and to disconnect and apply braking to said object for said stopping, (c) said stopping has to be at a predetermined place and sensor means are provided for indicating with a stopsignal the position of a particular point on said object relative to said place, (d) pulse generating motion indicating means connected to and responsive to movement of said object, and (e) counting means connected to and responsive to said motion indicating means, said method comprising the following steps to effect said stopping:

(A) programming said counting means to provide (1) a compensating stage dependent upon the speed of said object triggered by said stopsignal and (2) an operational stage for said clutch-brake means sequentially following said compensating stage and ending with the stopping of said object,

(B) initializing said counting means at an approximate set value for the start of said operational stage,

(C) counting down said counting means from the start to the finish of said operational stage from the current value of said set value to a lower intermediate value,

(D) counting down said counting means from the start to the finish of said compensating stage wherein said intermediate value is counted down to zero,



(E) setting said counting means at the current value of said set value,

(F) adjusting said set value so that said object stops at said predetermined place,

(G) continuing the process by running in a continuous loop between said steps (C) and (E).

4,987,547

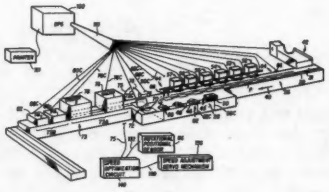
INSERTION MACHINE WITH SPEED OPTIMIZATION

K. George Rabindran, Morton Grove; David Filicicchia, Schaumburg, and Kenneth L. Guenther, Park Ridge, all of Ill., assignors to Bell & Howell Phillipsburg Company, Allentown, Pa.

Filed May 12, 1989, Ser. No. 350,856

Int. Cl.[5] G06F *15/46;* B65H *39/02*

U.S. Cl. 364—478 18 Claims



18. An insertion machine comprising:

a track;

a plurality of feeders which feed documents onto said track in a manner whereby related ones of said documents are associated into a set of such documents;

enveloping means for enveloping a set of associated documents in an enveloping medium;

drive means for cylically operating said track, said feeders, and said enveloping means in accordance with a machine cycle;

means for monitoring said machine cycle and obtaining a machine cycle speed;

means for determining an indication of the number of sets of

documents said machine successfully enveloped during a unit of time;

speed control means for using said machine cycle speed and said indication of the number of sets of documents successfully enveloped during a unit of time to determine whether the rate at which said machine performs said functions should be changed to result in a greater number of successfully enveloped sets of documents during a unit of time; and,

means connected to said speed control means for automatically changing said machine cycle rate.

4,987,548

ANALYZER OF PARTIAL MOLECULAR STRUCTURES

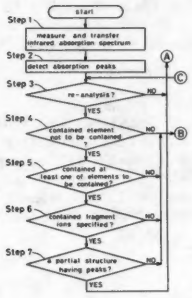
Keiji Saito, Yamaguchi; Katsuhiko Ichimura, and Takahiro Tajima, both of Kyoto, all of Japan, assignors to Shimadzu Corporation, Yamaguchi, Japan

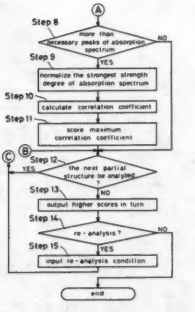
Filed Jul. 1, 1988, Ser. No. 214,439

Claims priority, application Japan, Jul. 4, 1987, 62-167486

Int. Cl.[5] G06F *15/46, 15/42*

U.S. Cl. 364—498 **16 Claims**





1. An analyzer for analyzing molecular structures within a specimen, comprising:

spectrophotometer means for producing an absorption spectrum data set of a specimen wherein the specimen has a partial molecular structure, said absorption spectrum data set having peaks of an absorption spectrum and associated absorption strength degrees;

data storage means for storing a wavenumber range, reference peaks of an absorption spectrum and reference absorption strength degrees associated with said peaks of the absorption spectrum, said reference peaks being within said wavenumber range;

analyzing means, operatively connected to said data storage means and said spectrophotometer means, for comparing wavenumbers of all said absorption peaks of the specimen with said wavenumber range stored within said data storage means to determine if said wavenumbers are within said wavenumber range, for calculating normalized strength degree of the absorption peaks of the specimen corresponding to said absorption spectrum data set produced by said spectrophotometer means, for calculating evaluation factors between said normalized strength degree of the absorption peaks of the specimen and said reference absorption strength degree stored within said data storage means, and for determining if a partial molecular structure is present within the specimen according to said evaluation factors; and

output means, operatively connected to said analyzing means, for outputting information regarding the partial molecular structures present within the specimen.

4,987,549

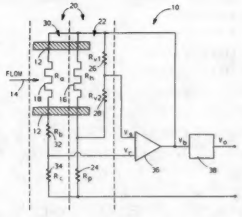
TEMPERATURE COMPENSATED FLOWMETER TECHNIQUES

Gregory P. Gee, Drayton Plains, Mich., assignor to General Motors Corporation, Detroit, Mich.

Filed Nov. 13, 1989, Ser. No. 434,134

Int. Cl.[5] G01F *1/00, 1/68;* G01L *1/20;* G01C *25/00*

U.S. Cl. 364—510 **9 Claims**



1. An apparatus for measuring the amount of flow of a flowing medium comprising:

a bridge circuit across which a bridge voltage Vb is developed such that the magnitude of the bridge voltage Vb is indicative of the amount of flow,

the bridge circuit including a signal side for deriving a signal voltage Vs which is a voltage divided function of the bridge voltage Vb as determined at least in part by the resistance Rh of a self-heated resistor in ratio to the resistance Rp of a power resistor where the resistance Rh is related to the temperature of the heated resistor as determined at least in part by the difference between the heat generated within the heated resistor as a function of the voltage applied across the resistor and the heat transferred away from the heated resistor as a function of the amount of fluid flow,

the signal side of the bridge circuit also including first and second vernier resistors having respective resistances Rv1 and Rv2 where the vernier resistors are connected in series across the self-heated resistor such that the first vernier resistor is connected to the high voltage end of the heated resistor while the second vernier resistor is connected to the low voltage end of the heated resistor and where the signal voltage Vs is derived from between the vernier resistors,

the bridge circuit also including a reference side for defining a reference voltage Vr which is a voltage divided function

of the bridge voltage Vb as determined at least in part by the sum (Ra+Rb) of the resistance Ra of an ambient resistor plus the resistance Rb of a ballast resistor in ratio to the resistance Rc of a calibration resistor where the resistance Ra of the ambient resistor is determined by the ambient temperature Ta of the flowing medium,

and an amplifier responsive to the difference between the signal voltage Vs and the reference voltage Vr for altering the bridge voltage Vb to alter the heat generated within the self-heated resistor thereby altering its temperature and related resistance Rh so as to equalize the signal voltage Vs and the reference voltage Vr,

the resistances Rp, Rb and Rc having values determined by an iterative numerical solution of the equations

$$\emptyset = C5*Ti^5 + C4*Ti^4 + C3*Ti^3 + C2*Ti^2 + C1*Ti + C\emptyset$$

$$\emptyset = K2*Tr^2 + K1*Tr + K\emptyset$$

in which the ideal temperature Ti to which the self-heated resistor should be heated for ideal temperature compensation and the real temperature Tr to which the self-heated resistor is actually heated by the bridge circuit are specified to be equal at three predetermined values of ambient temperature Ta within the ambient temperature range over which it is desired to temperature compensate the flowmeter where

$C5 = Ka*B4$
$C4 = Ka*(B3 - Ta*B4)$
$C3 = Ka*(B2 - Ta*B3)$
$C2 = Ka*(B1 - Ta*B2) - Vb^2*Z$
$C1 = Ka*(B0 - Ta*B1) - Vb^2*Y$
$C\emptyset = Ka*(\emptyset - Ta*B0) - Vb^2*X$
Ka = Watts/C.° from self-heated resistor **16**
$B4 = G^2*Z^2$
$B3 = G^2*2*Y*Z$
$B2 = 2*G*Rp*Z + G^2*(2*X*Z + Y^2)$
$B1 = 2*G*Rp*Y + G^2*(2*X*Y)$
$B\emptyset = 2*G*Rp*X + G^2*X^2*Rp^2$
$G = [Rp + (Rv1 + Rv2)]/(Rv1 + Rv2)$
$K2 = Z$
$K1 = Y$
$K\emptyset = X - [H1/(H2 - H3)]$
$H1 = (Ra + Rb)*Rp*(Rv1 + Rv2)$
$H2 = Rc*(Rv1 + Rv2)*(1 - Q)$
$H3 = (Ra + Rb)*[Rp + Q*(Rv1 + Rv2)]$
$Q = Rv2/(Rv1 + Rv2)$
$Ra = Ra\emptyset*(1 + Alpha*Ta + Beta*Ta^2)$
$Rh = Rh\emptyset*(1 + Alpha*Th + Beta*Th^2)$
$X = Rh\emptyset$
$Y = Rh\emptyset*Alpha$
$Z = Rh\emptyset*Beta$
$Ra\emptyset$ = Ra at zero °C.
$Rh\emptyset$ = Rh at zero °C.
Th = Temperature of self-heated resistor **16**.

such that the deviation between the real temperature Tr and the ideal temperature Ti is minimized over the ambient temperature range.

4,987,550

SELECTIVE PROCESSING OF A DATA STREAM BASED ON FONT FORMAT

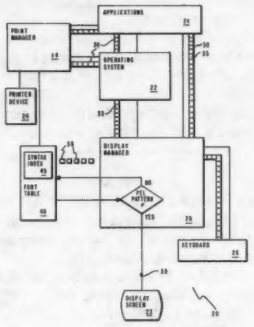
Anne G. Leonard, and Richard L. Verburg, both of Austin, Tex., assignors to International Business Machines Corporation, Armonk, N.Y.

Filed Sep. 22, 1987, Ser. No. 99,469
Int. Cl.[5] G06F *3/14*
U.S. Cl. 364—521 **32 Claims**

1. A processing system for displaying graphical symbols from a data stream having a specific syntax comprising:

a font file; and

means for structuring said font file to incorporate a processing model of said data stream,



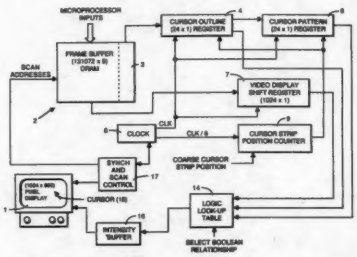
wherein said font file is changeable by an application to incorporate a different processing model of a different data stream having a different syntax.

4,987,551

APPARATUS FOR CREATING A CURSOR PATTERN BY STRIPS RELATED TO INDIVIDUAL SCAN LINES

Billy W. Garrett, Jr., Columbia, S.C., assignor to NCR Corporation, Dayton, Ohio

Continuation of Ser. No. 137,837, Dec. 24, 1987, abandoned. This application Nov. 24, 1989, Ser. No. 421,316
Int. Cl.[5] G06F *15/62*
U.S. Cl. 364—521 **5 Claims**



1. A cursor generator for a pixel bit mapped video display system, comprising:

a frame buffer memory for storing a bit mapped display a pattern with a plurality of display lines and having non-displayed addressable space with lines corresponding to each of aid display lines;

means for storing data representing a pattern of a cursor strip in said non-displayed space of the frame buffer memory;

means for reading data representing a line of the display pattern stored in the frame buffer memory;

means for reading data representing the pattern of the cursor strip for a line corresponding to a respective line of the display pattern, said cursor strip having a starting location within said line;

means for identifying said starting location; and

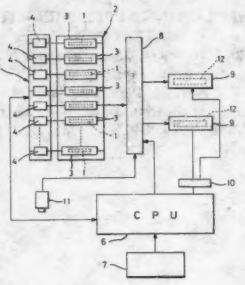
means for logically combining by pixel position the display pattern data and cursor strip data when said starting location has been identified.

4,987,552

AUTOMATIC VIDEO EDITING SYSTEM AND METHOD

Fumiko Nakamura, 2-22-20 Sanno Ota-Ku, Tokyo, Japan

Filed Feb. 8, 1988, Ser. No. 153,379
Int. Cl.[5] G06F *15/46*
U.S. Cl. 364—521 18 Claims



1. An automatic editing and recording system for producing personalized video tapes pertaining to makeup methods, said system comprising:

a control means;

a memory medium holding unit connected to said control means for holding at least one memory medium, said memory medium containing a plurality of video segments each depicting makeup methods, said video segments classified into categories corresponding to possible variations of the respective facial features of persons including at least shape of face, eyes, nose and mouth, wherein each said category is divided into subcategories corresponding to possible variations of said respective facial features;

a makeup method select means connected to said memory medium holding unit and to said control means to receive from said control means signals relating to the facial features of a particular person and, in accordance with those signals, to select various ones of said plurality of video segments; and

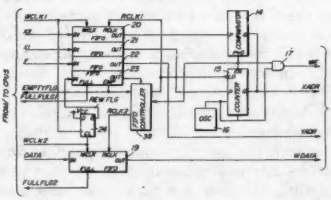
a video recorder connected to said makeup method select means to automatically record an edited, personalized video containing copies of the selected video segments depicting makeup methods.

4,987,553

STRAIGHT LINE DRAWING CONTROL APPARATUS

Shogo Oneda, Yokohama, and Yoshiaki Hanyu, Tokyo, both of Japan, assignors to Ricoh Company, Ltd., Japan

Filed Dec. 28, 1989, Ser. No. 458,515
Claims priority, application Japan, Jan. 9, 1989, 1-1216
Int. Cl.[5] G06K *1/00*
U.S. Cl. 364—521 15 Claims



1. A straight line drawing control apparatus comprising:

first first-in first-out memory means for inputting coordinate data indicative of coordinates of a straight line to be drawn in synchronism with a first write clock and inputting write data relating to luminance and/or color of said straight line in synchronism with a second write clock and for outputting said coordinate data in synchronism with a first read clock and outputting said write data in synchronism with a second read clock, said coordinate data, said write data and said first and second write clocks being supplied from an external device;

second first-in first-out memory means for inputting flag data indicating a change of said write data in synchronism with said first clock and for outputting said flag data in synchronism with said first read clock; and

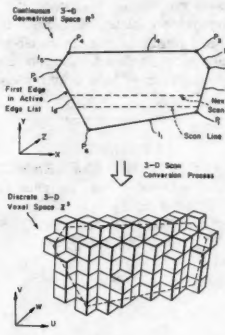
control means, coupled to said first and second first-in first-out means, for generating said first read clock and for generating said second read clock only when said flag data is supplied from said second first-in first-out memory means.

4,987,554

METHOD OF CONVERTING CONTINUOUS THREE-DIMENSIONAL GEOMETRICAL REPRESENTATIONS OF POLYGONAL OBJECTS INTO DISCRETE THREE-DIMENSIONAL VOXEL-BASED REPRESENTATIONS THEREOF WITHIN A THREE-DIMENSIONAL VOXEL-BASED SYSTEM

Arie E. Kaufman, Plainview, N.Y., assignor to The Research Foundation of State University of New York, Albany, N.Y.

Filed Aug. 24, 1988, Ser. No. 235,982
Int. Cl.[5] G06F *15/40*
U.S. Cl. 364—522 14 Claims



1. A method of converting a continuous 3-D geometrical representation of a 3-D polygon into a discrete set of connected voxels representing said 3-D polygon in 3-D discrete voxel space of a voxel-based system, each said voxel being specified by integer x, y and z coordinate values said 3-D polygon being defined by an edge list representing a closed sequence of edges, said edge list including edges being a 3-D straight line segment defined by first and second endpoints forming the vertices of said 3-D polygon, said vertices of said 3-D polygon specifying a plane equation of said 3-D polygon, said 3-D discrete voxel space being characterized by orthogonal x, y, and z coordinate directions, said method comprising the sequence of steps of:

(a) specifying a generalized coordinate system having orthogonal coordinate directions u, v and w, which form three principal planes u-v, u-2, and v-w, said 3-D discrete voxel space being characterized by said u, v and w coordinate directions, each said voxel being specified by integer u, v and w coordinate values, said u, v and w coordinate directions corresponding to said x, y and z coordinate directions in such a way that said polygon has a projection

of greatest area on said u-v plane and has a coordinate direction extent of smallest value along said w coordinate direction, said approximate plane equation being specified by plane equation coefficient α, β and Γ of said generalized coordinate directions u, v and w, respectively, and said coordinate direction w being defined as the depth direction of said polygon in said generalized coordinate direction;

(b) determining from said vertices, the minimum and maximum values of said u, v and w coordinate directions;

(c) defining an integer decision variable for said w coordinate direction, first and second integer decision threshold, integer decision variable increments and integer depth increments along each of said u and v coordinate directions, said definitions of said integer variables, decision thresholds, decision variable increments and depth increments being based on said α, β and Γ plane equation coefficients;

(d) determining the initial value for said coordinate direction value w for said vertex having said minimum value for said v coordinate direction;

(e) for each said edge in said edge list, determining

(i) the slope of said edge in said u-v plane based on said first and second end points of said edge, and

(ii) the depth increment along said edge based upon said u-v slope determined in substep (i) and said integer depth increment along said u-coordinate direction;

(f) ordering said edge list by ascending value of said v coordinate direction of said first endpoint; and

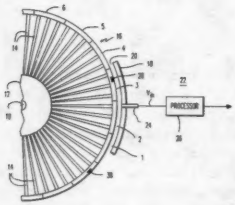
(g) converting said continuous 3-D polygon into said discrete set of voxels by stepping along said coordinate directions u and v and using decisional logic process for determining the integer value of said coordinate direction w, said conversion employing said edge list, said slopes of said edges in said u-v plane, said depth increment along said edges, said integer decision variable, said first and second integer decision thresholds, and said integer depth increments along each of said u and v coordinate directions.

4,987,555

TURBINE BLADE SHROUD CLEARANCE MONITOR

Michael Twerdochlib, Oviedo, Fla., assignor to Westinghouse Electric Corp., Pittsburgh, Pa.

Filed Nov. 30, 1988, Ser. No. 277,833
Int. Cl.[5] G01B *7/14*
U.S. Cl. 364—561 **10 Claims**



10. A method for monitoring the clearance between a plurality of turbine blade shroud segments forming a turbine blade shroud and a stationary portion of the turbine, comprising the steps of:

sensing eddy currents generated in each of the shroud segments to produce input signals representative of the clearance between each said shroud segment and the stationary portion of the turbine;

sensing eddy currents generated by indicia means of known dimension carried by the turbine blade shroud to produce a calibration signal representative of said known dimension of said indicia means; and

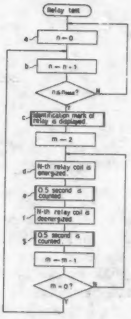
processing said input signals and said calibration signal to produce output signals indicative of the clearance between each said shroud segment and the stationary portion of the turbine, said output signals having a predetermined relationship to said calibration signal.

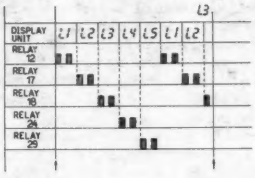
4,987,556

HEATING COOKING APPLIANCE WITH RELAY TESTING

Masayuki Aoki, Ichinomiya, Japan, assignor to Kabushiki Kaisha Toshiba, Kanagawa, Japan

Filed Nov. 20, 1989, Ser. No. 439,864
Claims priority, application Japan, Nov. 29, 1988, 63-301528
Int. Cl.[5] G05B *19/02*; G01R *31/02, 31/32*; H05B *6/64*
U.S. Cl. 364—580 **2 Claims**





1. A heating cooking appliance comprising:

(a) a microcomputer;

(b) a plurality of electromagnetic relays controlled by the microcomputer so as to be electrically closed and opened, the electromagnetic relays clicking when electrically closed,

(c) control parts including:

(i) a heat source operated by the electromagnetic relays,

(ii) a number of operation switches corresponding to different cooking modes respectively so that each cooking mode is selected when each corresponding operation switch is operated, at least two of the operation switches corresponding to cooking modes which are different from each other being manipulated simultaneously for initiating a relay test mode, and

(iii) a display unit for displaying the control status of the microcomputer;

and wherein said microcomputer is provided with:

means for determining that the two operation switches for initiating the relay test mode have been manipulated simultaneously,

means for generating test operation signals so that the electromagnetic relays are sequentially tested, based on the determination that the two operation switches have been manipulated for initiating the relay test mode, each

test operation signal comprising a plurality of pulses for each electromagnetic relay so that each electromagnetic relay is intermittently operated at a plurality of times and

means for generating identification signals synchronously with the generation of the test operation signals so that identification marks representing the respective electromagnetic relays are sequentially displayed by the display unit.

4,987,557

SYSTEM FOR CALCULATION OF SUM OF PRODUCTS BY REPETITIVE INPUT OF DATA

Yutaka Muraoka, Oshino, Japan, assignor to Fanuc Ltd., Minamitsuru, Japan

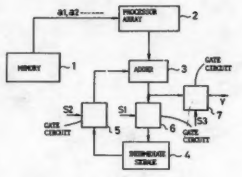
PCT No. PCT/JP88/00636, § 371 Date Feb. 9, 1989, § 102(e) Date Feb. 9, 1989, PCT Pub. No. WO88/10473, PCT Pub. Date Dec. 29, 1988

PCT Filed Jun. 25, 1988, Ser. No. 314,055

Claims priority, application Japan, Jun. 25, 1987, 62-156427

Int. Cl.[5] G06F *7/00, 15/00*

U.S. Cl. 364—750.5 **7 Claims**



1. A system for calculation of a sum of products in which n coefficients are multiplied by data items to obtain products, the products are added together to produce outputs, said system comprising:

a processor array means, having n/d processors, for receiving and shifting the data items of a data sequence to produce input data items and for multiplying the input data items individually by n/d of the n coefficients, said processor array adds together products of said processors and outputs the sum obtained as an output;

an adder, operatively connected to said processor array means, for adding the output of said processor array means to an intermediate output of said adder stored as an intermediate value; and

an intermediate storage unit, operatively connected to said adder, for storing the intermediate output of said adder as the intermediate value in an address thereof corresponding to a respective shift;

wherein the data sequence is input to the processor array means d times, the n/d coefficients set in said processors are varied to respective predetermined values each time the data sequence is input, and where n, d and n/d are integers;

wherein the reading of the intermediate value from said intermediate storage unit and the storing of the intermediate output supplied from said adder is delayed by n/d cycles each time, other than the first, the data sequence is input; and

wherein after the input of the data sequence d times the intermediate output of said adder is the sum of products of the n coefficients and the data items.

4,987,558

SEMICONDUCTOR MEMORY WITH VOLTAGE STABILIZATION

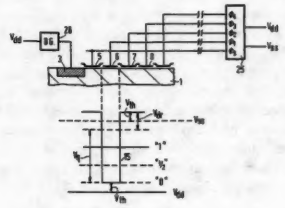
Arie Slob, Eindhoven, Netherlands, assignor to U.S. Philips Corp., New York, N.Y.

Filed Mar. 31, 1989, Ser. No. 332,686

Claims priority, application Netherlands, Apr. 5, 1988, 8800851

Int. Cl.[5] G11C *19/28*; H03K *23/46*

U.S. Cl. 365—183 **7 Claims**



1. A semiconductor memory device comprising a source zone located at a surface of a semiconductor body, a memory gate located beside the source zone and insulated from the surface, by means of which a potential well can be induced in the semiconductor body, in which potential well an information-representing charge packet in the form of a quantity of charge carriers supplied by the source zone can be stored, a power supply terminal for receiving a power supply voltage during operation, and a switching gate located between the source zone and the memory gate and insulated from the surface, by means of which the connection between the source zone and the potential well can be closed or interrupted, characterized in that voltage stabilization means are provided between said power supply terminal and said source zone to provide a voltage to the source zone during the introduction of charge carriers into said potential well in operation such that the potential difference between the potential at the memory gate and the potential at the source zone and the size of said charge packet are at least substantially entirely independent of voltage fluctuations at the memory gate resulting from fluctuations in said power supply voltage.

4,987,559

SEMICONDUCTOR MEMORY DEVICE HAVING A PLURALITY OF ACCESS PORTS

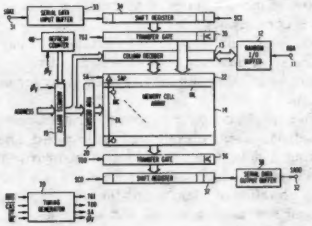
Mayu Miyauchi, and Satoru Kobayashi, both of Tokyo, Japan, assignors to NEC Corporation, Tokyo, Japan

Filed Mar. 6, 1989, Ser. No. 319,390

Claims priority, application Japan, Mar. 4, 1988, 63-52213

Int. Cl.[5] G11C *7/00*

U.S. Cl. 365—189.04 **4 Claims**



1. A semiconductor memory device comprising a memory

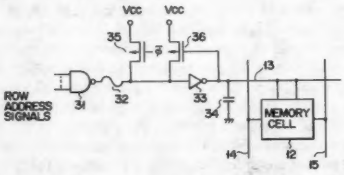
array of a plurality of memory cells arranged in a matrix form of rows and columns, means for selecting one of said rows thereby the enable the memory cells of the selected row for writing data thereto or reading data therefrom through said columns, a random access circuit coupled to said columns of said memory array for performing a random selection of said columns for reading data therefrom or writing data thereto in response to column address information, a first clock input terminal for receiving a first chain of clock signals, a second clock input terminal for receiving a second chain of clock signals, a serial output terminal, a serial output circuit coupled to said serial output terminal and said columns of said memory array for sequentially outputting at said serial output terminal data from said columns one by one in synchronism with said first chain of clock signals, a serial input terminal, an input register having a plurality of storage locations, a serial input circuit coupled to said serial input terminal and said input register for sequentially writing data applied to said serial input terminal to said input register one by one in synchronism with said second chain of clock signals, and a write circuit for operatively writing data stored in said input register to said columns in parallel simultaneously.

4,987,560

SEMICONDUCTOR MEMORY DEVICE

Takahiro Hamano, Yamato; Masataka Matsui, Tokyo, and Mitsuo Isobe, Tama, all of Japan, assignors to Kabushiki Kaisha Toshiba, Kawasaki, Japan

Filed Mar. 27, 1989, Ser. No. 328,662
Claims priority, application Japan, Mar. 30, 1988, 63-76951
Int. Cl.[5] G11C *7/00, 29/00*
U.S. Cl. 365—200 **4 Claims**



1. A semiconductor memory device comprising a main memory cell array and a spare memory cell array, wherein each of the memory cell arrays includes a plurality of rows, each of which comprises a plurality of memory cells, each of which is identified by a row address signal corresponding to the row of the memory cell arrays in which each memory cell resides and by a column address signal corresponding to the column of the memory cell arrays in which each memory cell resides, and wherein the semiconductor memory device has a redundancy function for substituting a row of memory cells in said main memory cell array with a row of memory cells of said spare memory cell array when a one of the memory cells in the row of memory cells of said main memory cell array is defective, comprising:

a plurality of main word lines to a respective one of which a plurality of memory cells arranged in a respective one of the rows of said main memory cell array are connected in parallel; and

a main row decoder for receiving row address signals and for driving said plurality of main word lines, wherein during a data access period said main row decoder receives a row address signal and selectively drives a one of said plurality of main word lines in response to the received row address signal, and wherein

said main row decoder comprises partial decoders, the number of which is equal to the number of said main word lines, and each of said partial decoders includes:

a decoder for, during the data access period, receiving a row address signal;

a drive circuit for driving a corresponding one of said plurality of main word lines in response to an output from said decoder;

a fuse element inserted between an output terminal of said decoder and an input terminal of said drive circuit; and

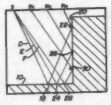
a MOS transistor having a source, drain and gate, a source-drain path being connected between an input terminal of said drive circuit and the predetermined potential, and means for applying a pulse signal to the gate to render the MOS transistor conductive when one of the memory cells connected to the corresponding main word line is defective.

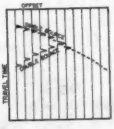
4,987,561

SEISMIC IMAGING OF STEEPLY DIPPING GEOLOGIC INTERFACES

David W. Bell, Ponca City, Okla., assignor to Conoco Inc., Ponca City, Okla.

Continuation of Ser. No. 287,951, Dec. 19, 1988, abandoned.
This application Jun. 1, 1990, Ser. No. 532,156
Int. Cl.[5] G01V *1/00, 1/28*
U.S. Cl. 367—53 **12 Claims**





11. A method for determining the location of steeply dipping subsurface interfaces comprising the steps of:

receiving electrical signals representing seismic waves reflected from subsurface interfaces;

identifying selected electrical signals representing seismic waves having reflected from a substantially horizontal interface and a steeply dipping interface;

separating said selected electrical signals by comparing arrival times of said seismic acoustic pulses at each of said various offsets and separating said electrical signals representing seismic acoustic pulses having horizontal and vertical interface reflections;

obtaining a subsurface acoustic velocity;

approximating locations of said steeply dipping interface;

calculating a modified source-receiver offset using said subsurface acoustic velocity and each approximated location of the steeply dipping interface;

determining a two way travel time correction factor;

using said correction factor to convert the scale of said two way travel time for said horizontal interface to a two way travel time for each of said assumed locations of said steeply dipping interface by multiplying said two way travel time for said horizontal interface by the formula:

$$\frac{X - \mathrm{OFF}}{X}$$

where

OFF=an actual offset from said various offsets,

X=a calculated new offset corresponding to said actual offset;

segregating said selected electrical signals representing seismic pulses having substantially similar correction factors;

summing said segregated selected electrical signals for predetermined points on said steeply dipping interface for each assumed location to obtain a maximum sum; and

displaying a location of said steeply dipping subsurface interface represented by said maximum sum.

4,987,562

SEMICONDUCTOR LAYER STRUCTURE HAVING AN ALUMINUM-SILICON ALLOY LAYER

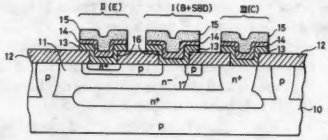
Kiyoshi Watanabe, Yokohama, Japan, assignor to Fujitsu Limited, Kawasaki, Japan

Filed Aug. 22, 1988, Ser. No. 234,781

Claims priority, application Japan, Aug. 28, 1987, 62-212837

Int. Cl.[5] H01L *23/48, 29/46, 29/52, 29/60*

U.S. Cl. 357—67 **8 Claims**



1. A semiconductor layer structure comprising:

a silicon substrate;

an alloy layer of aluminum and silicon formed on the silicon substrate, the concentration of silicon contained in the aluminum-silicon alloy layer being within a range of 10 to 75 weight percent;

a barrier layer formed on top of the aluminum-silicon alloy layer; and

a metallic layer formed on top of the barrier layer, the barrier layer preventing the silicon contained in the alloy layer from diffusing into the metallic layer.

4,987,563

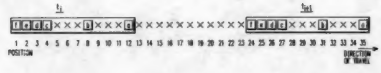
SYNTHETIC APERTURE MINIMUM REDUNDANCY SONAR APPARATUS

John E. Gilmour, Pasadena, Md., assignor to Westinghouse Electric Corp., Pittsburgh, Pa.

Filed Feb. 7, 1990, Ser. No. 476,209

Int. Cl.[5] G01S *15/00*

U.S. Cl. 367—88 **8 Claims**



1. Carrier-borne synthetic aperture sonar apparatus, comprising:

(a) means for transmitting an acoustic pulse toward a target area under investigation in repetitive transmission cycles during course of travel of said carrier;

(b) an array of transducer elements aligned from first to last in the direction of carrier travel, with the first transducer element being first in said direction of travel;

(c) each said transducer element being operable to provide a respective output signal in response to impingement of acoustic energy reflected back from said target area as a result of a said transmission;

(d) said means for transmitting being operable to transmit acoustic pulses during said course of travel such that there is a predetermined gap between the first transducer element at an array position at which a transmission takes place and the last transducer element at a next array position at which a transmission takes place; and

(e) signal processing means responsive to said output signals provided by said transducer elements as a result of a predetermined number of said transmissions for generating at least one beam output signal.

4,987,564

ACOUSTIC APPARATUS

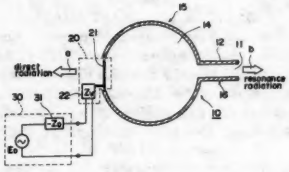
Kenji Yokoyama, Hamamatsu, Japan, assignor to Yamaha Corporation, Hamamatsu, Japan

Continuation of Ser. No. 286,869, Dec. 19, 1988, abandoned. This application Apr. 26, 1990, Ser. No. 517,416

Claims priority, application Japan, Dec. 28, 1987, 62-334262

Int. Cl.[5] H04R *3/00*

U.S. Cl. 367—140 **17 Claims**



1. An acoustic apparatus comprising:

a resonator having a resonance radiation unit for radiating an acoustic wave by resonance;

a vibrator having a diaphragm including a direct radiation portion for directly radiating an acoustic wave and a resonator driver portion for driving said resonator, the vibrator having an internal impedance; and

a vibrator drive means for driving the vibrator, the drive means including drive control means for substantially counteracting the internal impedance of the vibrator so as to reduce the damping effect of the vibrator on the resonator by an amount sufficient to render the radiation characteristics of the resonator and vibrator independently controllable.

4,987,565

APPARATUS FOR DRIVING OBJECTIVE LENS

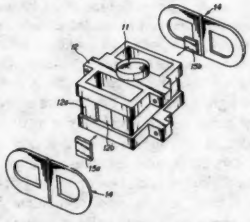
Tetsuo Ikegame, Hachioji, Japan, assignor to Olympus Optical Co., Ltd., Tokyo, Japan

Filed Jan. 19, 1989, Ser. No. 299,067

Claims priority, application Japan, Jan. 22, 1988, 63-10939; Jan. 25, 1988, 63-12488

Int. Cl.[5] G11B *7/00*

U.S. Cl. 369—44.15 **9 Claims**



1. An apparatus for driving an objective lens which is used to project a light beam onto an information track on an optical record medium including a lens holder for holding the objective lens, a supporting means for supporting the lens holder

movably in first and second directions which are substantially orthogonal to each other, at least one coil secured to the lens holder and a magnetic means for generating a magnetic flux passing through said coil to generate a force acting in the first direction, the improvement being characterized in that a first force generated at a first portion of the coil which first portion extends in said second direction is increased relative to a second force generated at a second portion of the coil, said second portion extending in the first direction.

4,987,566

OPTICAL HEAD APPARATUS

Shinsuke Shikama; Eiichi Toide; Mitsushige Kondou, all of Nagaokakyo, and Kazuo Iwata, Gunma, all of Japan, assignors to Mitsubishi Denki Kabushiki Kaisha, Tokyo, Japan

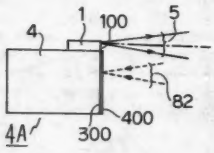
Continuation of Ser. No. 159,412, Feb. 12, 1988, Pat. No. 4,888,760, which is a continuation of Ser. No. 883,872, Jun. 9, 1986, abandoned. This application Apr. 21, 1989, Ser. No. 341,649

Claims priority, application Japan, Jul. 29, 1985, 60-167010; Jul. 29, 1985, 60-167011

The portion of the term of this patent subsequent to Dec. 19, 2006, has been disclaimed.

Int. Cl.[5] G11B *7/00*; H01L *39/02*

U.S. Cl. 369—122 **6 Claims**



1. In an optical head apparatus having a light source with an optical axis mounted on a base element in a manner that a light emitting end face of said light source is oriented adjacent a front end face of said base element; optical incident means for diffracting a light beam emitted from said light source into a plurality of diffracted light beams and for focusing said diffracted light beams to a zeroth and first order spot light on a data storage media; splitter means interposed in said optical incident means for separating light beams coming from the side of said light source from reflected light beams coming from said data storage media; and photodetection means constructed of a plurality of photoreceptors for receiving light beams having been separated by said splitter means, the improvement comprising wherein a light beam treating means is provided adjacent said light source for preventing a reflecting of a re-incident light beam which is conjugate to the first order spot light on said data storage media from said optical incident means back to said optical incident means, said light beam treating means being provided on at least a portion of said base element, on which portion said re-incident light beam not having been separated by said splitter means would normally become incident again, and wherein said front end face of said base element is, inclined in a horizontal first plane, at an angle to a second plane perpendicular to said optical axis, said second plane being parallel to said light emitting end face of said light source.

4,987,567

OPTICAL WAVELENGTH MULTIPLEXER/DEMULTIPLEXER AND DEMULTIPLEXER/REMULTIPLEXER

Carl F. Buhrer, Framingham, Mass., assignor to GTE Laboratories Incorporated, Waltham, Mass.

Filed Nov. 21, 1988, Ser. No. 274,242

Int. Cl.[5] H04J *1/00, 14/00*

U.S. Cl. 370—3 **24 Claims**

1. An optical multichannel wavelength demultiplexer for dividing an input consisting of a plurality of adjacent channels of optical signals among a number of outputs, comprising:

at least two birefringent filter stages;

each of said filter stages having a transmission function with even symmetry about optical frequencies at the centers of both the longest and shortest wavelength channels within said plurality of adjacent channels;

each of said birefringent filter stages being constructed from a plurality of identical crystal elements; and

the identical elements of each of said birefringent filter stages are identical to the elements of every other birefringent filter stage, the number of said identical elements in each stage being determined by said transmission functions.

4,987,568

MONITOR SYSTEM FOR MULTIPLEX EQUIPMENT

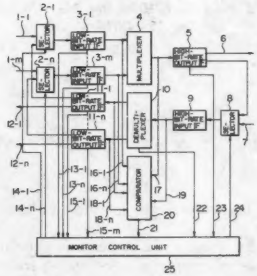
Sigeo Shinada; Hiroyuki Fujita, both of Yokohama, and Yoichi Nagata, Yokosuka, all of, assignors to Hitachi, Ltd., Tokyo, Japan

Filed Apr. 8, 1988, Ser. No. 179,306

Claims priority, application Japan, Apr. 10, 1987, 62-87132

Int. Cl.[5] H04L *1/24*

U.S. Cl. 370—15 **4 Claims**



1. A monitor system for a multiplex equipment including a plurality of low-bit-rate input interfaces for code-converting low-bit-rate input signals, a multiplexer for multiplexing a plurality of low-bit-rate signals converted in code, a high-bit-rate output interface for codeconverting the multiplexed signal, a high-bit-rate input interface for code-converting high-bit-rate input signals, a demultiplexer for demultiplexing a code-converted high-bit-rate signal into a plurality of low-bit-rate signals, and a plurality of low-bit-rate output interfaces for

code-converting the demultiplexed low-bit-rate signals, said monitor system comprising:

a comparator for comparing input and output signals of the multiplexer to each other and input and output signals of the demultiplexer to each other;

signal-loss detectors included in the low-bit-rate output interfaces and the high-bit-rate output interface, respectively;

signal-loss detectors included in the low-bit-rate input interfaces and the high-bit-rate input interface, respectively;

a plurality of selectors for looping an output of an output interface of a particular speed back upon an input of an input interface of the particular speed; and

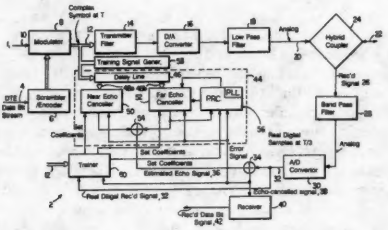
a monitor control unit for monitoring the multiplexer and the demultiplexer in response to an output signal representing the result of comparison at the comparator, each of the interfaces being monitored by a signal from the signal-loss detector or by a signal from the signal-loss detector for the signal loopbacked by the selector.

4,987,569

FAST TRAINING ECHO CANCELLER

Fuyun Ling, Jamaica Plain, and Guozhu Long, Cambridge, both of Mass., assignors to Codex Corporation, Mansfield, Mass.

Filed Apr. 5, 1989, Ser. No. 333,992
Int. Cl.[5] H04J 3/00
U.S. Cl. 370—32.1 **42 Claims**



1. A modem for communicating with a remote device in both directions over a channel, the modem comprising:

a. a transmitter for transmitting information over the channel;

b. a receiver for receiving a signal on the channel possibly including a real echo signal;

c. an echo canceller for estimating the real echo signal, the echo canceller module having variable coefficients; and

d. a trainer module for applying a complex training signal sequence to the transmitter and for computing the variable coefficients based upon correlations between the complex training signal sequence and only the corresponding real echo signal.

4,987,570

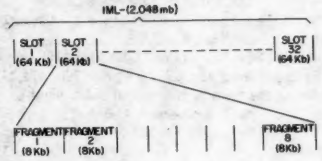
METHODS AND APPARATUS FOR PERFORMING TIME INTERLEAVED MULTIPLEXED RATE ADAPTATION FOR SUB-RATE CHANNELS IN A DIGITAL DATA COMMUNICATION SYSTEM

Gary R. Almond, Frederick, and David W. Storey, Dickerson, both of Md., assignors to Data General Corporation, Westboro, Mass.

Filed Feb. 9, 1989, Ser. No. 308,354
Int. Cl.[5] H04J 3/07
U.S. Cl. 370—84 **12 Claims**

7. Apparatus for multiplexing a plurality of sub-rate channels, in accordance with a predefined time interleaved multiplexing protocol, in a digital switching system having a plurality of system users operating at sub-rate frequencies and having a switching granularity of "x" bits per second, comprising:

(a) means for receiving channel data from said system user; and



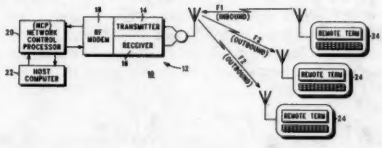
(b) means, coupled to said means for receiving, for performing a single level of rate adaptation on received data to insert synchronized sub-rate channel data into t bit frames that are integral sub-multiples of x bits per second.

4,987,571

DATA COMMUNICATION SYSTEM WITH PRIORITIZED PERIODIC AND APERIODIC MESSAGES

William D. Haymond, Surrey; Roderick J. Sillett, Delta, and Robert M. Lukas, Burnaby, all of Canada, assignors to Motorola, Inc., Schaumburg, Ill.

Filed Jul. 25, 1989, Ser. No. 384,611
Int. Cl.[5] H04J 3/02
U.S. Cl. 370—85 **16 Claims**



1. In a data communications system having inbound and outbound communication channels on which a central station and a plurality of remote terminal units operate, a slotted CSMA contention arrangement for selectively controlling the operation of such remote terminal units, comprising in combination:

said inbound channel being divided into a plurality of standardized microslots of a given duration and wherein said outbound channel is adapted to convey inbound channel busy status information; and

means for prioritizing access to the inbound channel by the remote units when transmitting periodic and aperiodic messages thereon,

said remote units being permitted to transmit periodic messages at the start of the first microslot after the inbound channel is sensed not busy, and to transmit aperiodic messages only after waiting an additional one microslot to determine the inbound channel remains not busy.

4,987,572

APPARATUS AND ASSOCIATED METHODS FOR CONVERTING ASYNCHRONOUS NONHOMOGENEOUS VARIABLE WIDTH PARALLEL DATA TO A FORMAT SUITABLE FOR TRANSMISSION OVER SYNCHRONOUS HIGH SPEED SERIAL TRANSMISSION MEDIA

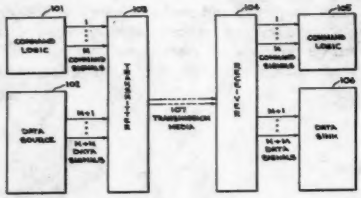
Paul H. Scott, San Jose, Calif., assignor to Advanced Micro Devices, Inc., Sunnyvale, Calif.

Continuation of Ser. No. 811,045, Dec. 18, 1985, abandoned. This application Jan. 29, 1990, Ser. No. 474,237

The portion of the term of this patent subsequent to Sep. 18, 2007, has been disclaimed.

Int. Cl.[5] H04J *3/04*

U.S. Cl. 370—91 **33 Claims**



1. Apparatus for converting asynchronous nonhomogeneous variable width parallel data pattern input signals to serial data pattern signals, representative of said input signals, suitable for transmission over a synchronous high speed serial transmission media, including at least one transmitter device wherein each such device comprises:

(a) first means, including first storage means, for clocking one of said asynchronous inputs into said first storage means;

(b) second means, including second storage means, for synchronously transferring data from said first storage means into said second storage means, thereby freeing said first storage means to accept a new input;

(c) third means, including data encoding means, responsive to data transferred into said storage means, for identifying the type of nonhomogeneous data input and for internally, automatically, multiplexing said data to said data encoding means wherein said identified data is encoded in accordance with a preselected coding convention; and

(d) fourth means coupled to said third means, for synchronously accepting newly encoded data from said encoding means for insertion into an output serial bit stream.

4,987,573

TELEPHONE SYSTEM DIGITAL CHANNEL BANK INTERFACE

Jean-Yves Monette, Prevost, and Sylvain Desabrais, Mirabel, both of Canada, assignors to Pulsecom Division of Hubbell Incorporated, Herndon, Va.

Continuation of Ser. No. 238,617, Aug. 31, 1988, Pat. No. 4,901,344. This application Dec. 26, 1989, Ser. No. 456,944

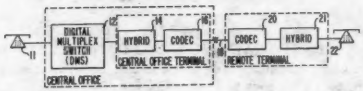
The portion of the term of this patent subsequent to Feb. 13, 2007, has been disclaimed.

Int. Cl.[5] H04J *3/12*; H04M *1/00*

U.S. Cl. 370—111 **2 Claims**

1. An improved telephone system of the type having a remote terminal, a plurality of electronic business set telephone instruments connected to the remote terminal, each electronic business set telephone instrument including a key pad, a plurality of function keys and means responsive to actuation of each key pad key or function key to generate a unique ASK function code including a sequence of pulses of a tone at a frequency significantly above voiceband frequency, a central office including digital multiplex switch (DMS) means for responding to function codes generated by an electronic business set telephone instrument and for directing calls to a selected telephone instrument identified by a unique dialing sequence, and a plurality of telephone lines interconnecting the remote terminal and the central office terminal, the improvement comprising the combination of coder-decoder means in said remote terminal including means for receiving a composite signal in one direction including voice frequency analog voice signals and said function codes from an electronic business set telephone instrument and for producing a sequence of digital output words representative of said analog voice signals for delivery to said telephone lines,

means at said central office and at said remote terminal for determining when an ASK function code is present and



for representing, in digital format the presence of said ASK function code, and

means for inserting the representation in digital format of said ASK function into a digital word,

said coder-decoder means further including means for receiving digital words from said telephone lines, for converting said received digital words into analog signals for delivery to a selected electronic business set telephone instrument and for generating ASK signals in response to recognition of the presence of ASK signals in the 8 bit word whereby said ASK function code is transmitted from another electronic business set telephone instrument and to or from said DMS means without increasing the bandwidth of said telephone lines.

4,987,574

HELIUM-NEON LASERS

William R. C. Rowley, Twickenham, and Patrick Gill, Chiddingford, both of Great Britain, assignors to The Secretary of State for Trade and Industry in Her Britannic Majesty's Government of the United Kingdom of Great Britain and Northern Ireland, London, England

PCT No. PCT/GB88/00352, § 371 Date Nov. 3, 1989, § 102(e) Date Nov. 3, 1989, PCT Pub. No. WO88/09072, PCT Pub. Date Nov. 17, 1988

PCT Filed May 5, 1988, Ser. No. 435,394

Claims priority, application United Kingdom, May 8, 1987, 8710884

Int. Cl.[5] H01S *3/10*

U.S. Cl. 372—28 **9 Claims**

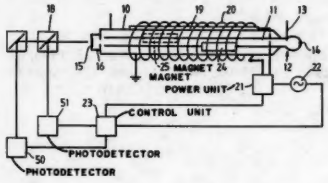
1. In a helium-neon laser of the type emitting radiation in the ranges of ultra-violet, infra-red and visible, other than red light, said laser having a laser tube with a length and circumference, the laser tube emitting the radiation in at least two modes, a stabilising system including, in combination:

a heating system means for supplying heat substantially uniformly along the length of the laser tube and asymetrically around the circumference of the laser tube, for bending the laser tube towards an optimum alignment;

a permanent magnetic field means for reducing instability of

mode polarisations and to optimise relative intensities of the modes;

means for frequency modulation by cyclically varying the tube length; and



means providing active frequency stabilisation by control of the tube length, with a stabilisation signal derived from at least one of a steady, varying intensity, and intensities of at least two orthogonally polarised optical outputs.

4,987,575

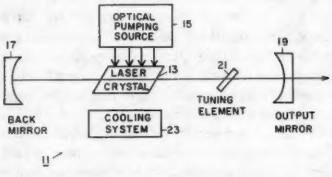
TETRAVALENT CHROMIUM (CR_{4+}) AS A LASER-ACTIVE ION FOR TUNABALE SOLID-STATE LASERS

Robert R. Alfano, 3777 Independence Ave., Bronx, N.Y. 10463, and Vladimir Petricevic, 730 Fort Washington Ave., Apt. 4C, New York, N.Y. 10040

Continuation-in-part of Ser. No. 248,749, Sep. 26, 1988, which is a continuation-in-part of Ser. No. 128,811, Dec. 4, 1987. This application Dec. 14, 1989, Ser. No. 450,462

Int. Cl.[5] H01S *3/16*

U.S. Cl. 372—41 **2 Claims**



1. A laser comprising:

a. a laser medium comprising a single crystal of dielectric material doped with chromium ions in the tetravalent state, the single crystal being a crystal of olivine-like structure such as germanates of formula (A) (RE)GeO_4 where (A=NA or Li, RE=Y, Lu or Gd), crystals of willemite structure Zn_2(Si or Ge)O_4 or any other single-crystal or polycrystalline compound containing tetrahedral sites in its crystal lattice, such as $Ca_3La_2(SiO_4)_6$ and YAG,

b. optical means for exciting said laser medium with wavelengths in the absorption region of said crystal to emit coherent optical radiation, and

c. an optical resonant cavity for supporting coherent radiation emitted by the laser medium in the fluorescence region.

4,987,576

ELECTRICALLY TUNABLE SEMICONDUCTOR LASER WITH RIDGE WAVEGUIDE

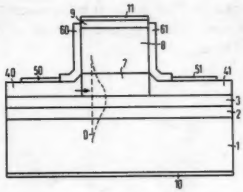
Jochen Heinen, Haar, Fed. Rep. of Germany, assignor to Siemens Aktiengesellschaft, Berlin and Munich, Fed. Rep. of Germany

Filed Nov. 3, 1989, Ser. No. 431,236

Claims priority, application Fed. Rep. of Germany, Nov. 30, 1988, 3840411

Int. Cl.[5] H01S *3/19*

U.S. Cl. 372—46 **11 Claims**



1. A semiconductor laser with a MCRW structure on a substrate of III-V semiconductor material, having an active layer, a ridge, a substrate contact and a ridge contact, comprising:

the active layer, an intermediate layer, a stripe-shaped tuning layer flanked by a first lateral region layer and by a second lateral region layer being grown onto the substrate on top of one another, and a stripe-shaped cover layer and a contact layer being grown on top of one another above this tuning layer;

a substrate contact being applied on a side opposed from the overgrown side of the substrate and the ridge contact being applied on the contact layer;

the first lateral region layer being provided with a first tuning contact; and

the second lateral region layer being provided with a second tuning contact.

4,987,577

GAS LASER HAVING MICROWAVE EXCITATION

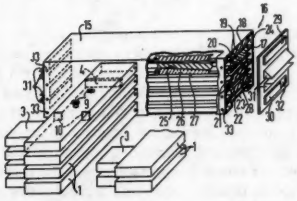
Horst Seunik; Hans Krueger, both of Munich, and Hubert Weber, Augsburg, all of Fed. Rep. of Germany, assignors to Siemens Aktiengesellschaft, Berlin and Munich, Fed. Rep. of Germany

Filed Apr. 10, 1990, Ser. No. 506,822

Claims priority, application Fed. Rep. of Germany, Apr. 14, 1989, 3912345

Int. Cl.[5] H04S *3/097*

U.S. Cl. 372—82 **24 Claims**



1. In a gas laser of the type having microwave excitation, and which comprises a housing and at least one waveguide of a feed unit coupled to said housing for the purpose of feeding microwave energy thereto, said housing and said waveguide

form a gas discharge space in which an electrical field is formed at a selected frequency, said gas discharge space is closed off from a microwave generator via a microwave window in the feed unit, said microwave generator lying outside of the laser housing, at least one ignition element for igniting a plasma discharge is arranged in the discharge space, the improvement comprising:

said laser housing including laser waveguide means forming at least one laser one waveguide including a longitudinal ridge in said laser housing;

said longitudinal ridge forming a part of a discharge gap for a laser discharge; and

said at least one ignition element is mounted to said housing outside of said discharge gap to increase the obtainable power/volume.

4,987,578

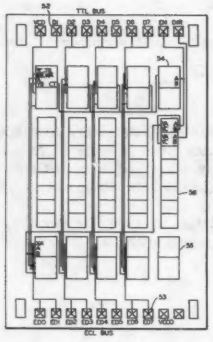
MASK PROGRAMMABLE BUS CONTROL GATE ARRAY

Joseph F. Akins; Donald G. Goddard; Cynthia P. Goszewski, all of Austin, Tex., and Ernest D. Haacke, Scarborough, Mass., assignors to Advanced Micro Devices, Inc., Sunnyvale, Calif.

Filed Oct. 7, 1988, Ser. No. 254,751

Int. Cl.[5] H03K *3/29*

U.S. Cl. 375—121 **22 Claims**



1. A customizable communications bus control gate array for facilitating communications between device on two disparate digital communications channels comprising a mask programmable integrated circuit having a first I/O interface means for connection to said first communications channel, a second I/O interface means for connection to said second communications channel, translating means operatively connected to each of said I/O interface means for translating the electrical signals therebetween, and logic control means including electrical I/O control means and information control means, said logic control means being operatively connected to both of said I/O interface means and to said translating means for respectively regulating electrical performance of each I/O interface means, and the direction and timing of information flow between said communications channels.

4,987,579

ELECTRONIC CLINICAL THERMOMETER

Yasuhiro Yoshinaka, and Yutaka Muramoto, both of Fuji, Japan, assignors to Terumo Kabushiki Kaisha, Tokyo, Japan

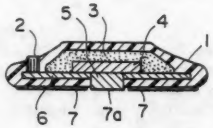
PCT No. PCT/JP87/00915, § 371 Date May 24, 1989, § 102(e) Date May 24, 1989, PCT Pub. No. WO88/04040, PCT Pub. Date Jun. 2, 1988

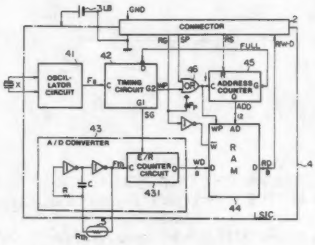
PCT Filed Nov. 26, 1987, Ser. No. 362,451

Claims priority, application Japan, Nov. 26, 1986, 61-279693; Nov. 26, 1986, 61-279694; Nov. 26, 1986, 61-279695

Int. Cl.[5] G01K *7/22;* **A61B** *5/00*

U.S. Cl. 377—25 **6 Claims**





1. An electronic clinical thermometer for making temperature measurement on a body surface, comprising:

a flexible substrate;

an electronic circuit, mounted on said flexible substrate, including a temperature-responsive element making surface-to-surface contact with said flexible substrate and a signal extracting portion having signal pins;

a flexible, heat-insulative covering member for surrounding said electronic circuit and said flexible substrate except for one surface of said temperature-responsive element and the signal pins of said signal extracting portion and for sealing remaining elements of said electronic clinical thermometer from ambient air; and

adhesive means, peripherally extending from said temperature-responsive element on an outer surface of said covering member, for maintaining contact and position between the one surface of said temperature-responsive element and the body surface.

4,987,580

CHARGE TRANSFER DEVICE HAVING CAPACITIVE FEEDBACK

Marcellinus J. M. Pelgrom, Eindhoven; Antonius J. G. Jochijms, Sevenum, and Arthur H. M. Van Roermund, Eindhoven, all of Netherlands, assignors to U.S. Philips Corp., New York, N.Y.

Filed Jun. 20, 1988, Ser. No. 209,444

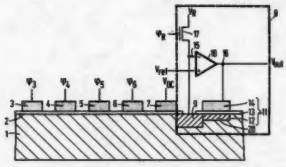
Claims priority, application Netherlands, Jun. 30, 1987, 8701528

Int. Cl.[5] G11C *27/02;* **H01L** *29/78*

U.S. Cl. 377—60 **8 Claims**

1. A semiconductor device comprising a semiconductor body which is provided at a surface with a charge transfer

device having an output stage which comprises a read-out zone located at the surface and an amplifier having a feedback capacitor, an inverting input of the amplifier being connected to the read-out zone and an output of the amplifier being fed back via the capacitor to the input, characterized in that the capacitor comprises a surface region in the semiconductor



body, a dielectric layer on the surface and an electrically conducting layer on the dielectric layer, in that the surface region is connected to the read-out zone and in that means are provided by which during operation of the charge transfer device the surface potential of the surface region of the feedback capacitor is solely determined by the potential of the read-out zone.

4,987,581

CAM-CONTROLLED AUTOMATIC DYNAMIC FOCUSING FOR COMPUTED TOMOGRAPHY

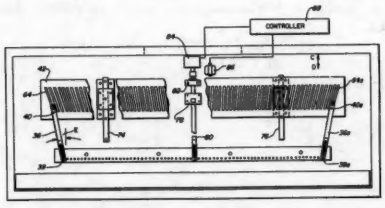
Richard T. Bernard: Lincolnshire, Ill., assignor to Bio-Imaging Research, Inc., IL

Continuation of Ser. No. 122,797, Nov. 19, 1987. This application Mar. 21, 1990, Ser. No. 496,681

The portion of the term of this patent subsequent to Oct. 3, 2006, has been disclaimed.

Int. Cl.[5] A61B *6/00*; G21K *1/00*

U.S. Cl. 378—19 **10 Claims**



1. A dynamic focusing device for a penetrating radiation scanner, said device comprising at least one detector means located in a position to receive, be illuminated by, and respond to penetrating radiation; a source of penetrating radiation; means for moving said source of penetrating radiation toward or away from said detector means; said detector means comprising a plurality of individual detectors, a plurality of septa for separating said individual detectors, said septa extending beyond said individual detectors far enough to reduce lateral penetrating radiation scatter and to cast shadows upon said individual detectors responsive to illuminations thereof from said penetrating radiation source; said detector means being in the form of at least one elongated module carrying a plurality of said septa and individual detectors, said elongated module having a pivot point at one end and a cam follower at the opposite end, said device further comprising movable focuser means having a cam surface on which said cam follower rides to swing said detector means about said pivot point in response to movement of said focuser means; and means for moving said movable focuser means in order to dynamically change the position of said module as a function of any change in the distance from said detector means to said source of penetrating radiation in order to reduce substantially to a minimum any shadow cast by said septa upon said detectors.

4,987,582

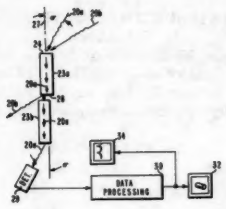
X-RAY FLUORESCENCE IMAGING OF ELEMENTS

Jackie R. Webster, Irvine; Keith V. Pearson, Wilmington; David B. Chang, Tustin; Norton L. Moise, Pacific Palisades, and Victor Vali, Laguna Hills, all of Calif., assignors to Hughes Aircraft Company, Los Angeles, Calif.

Filed Oct. 19, 1989, Ser. No. 423,831

Int. Cl.[5] G21K *1/06*; G01N *23/223, 23/20*; G01T *1/36*

U.S. Cl. 378—85 **6 Claims**



1. A system for detecting the presence of elements in an object comprising:

gamma ray source means for irradiating an object with gamma rays of predetermined minimum energy to produce X-ray fluorescence of elements therein;

X-ray detector means, including a first dislocation free single crystal having substantially parallel input and transmission surfaces at opposite ends thereof, positioned to intercept X-rays radiated by said elements, and disposed at an angle of incidence with respect to the X-rays to transmit only X-rays incident at predetermined Bragg angles characteristic of a known element; and

further including a second dislocation free single crystal disposed substantially parallel to the first crystal and having a predetermined offset therefrom to intercept and measure X-rays transmitted by the first crystal at a specific Bragg angle.

4,987,583

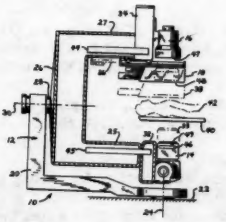
AUTOMATIC BACKOUT CONTROL FOR A MOTORIZED POSITIONING X-RAY APPARATUS

Frank C. Travanty, Waukesha; Philip M. Allen, Oconomowoc, and Vinod K. Chopra, Brookfield, all of Wis., assignors to General Electric Company, Milwaukee, Wis.

Filed Apr. 25, 1989, Ser. No. 343,462

Int. Cl.[5] H05G *1/08*

U.S. Cl. 378—91 **16 Claims**



1. In an X-ray apparatus having a structural member driven by a motor, a motor control circuit comprising:

a first power supply for applying electricity to said motor, in

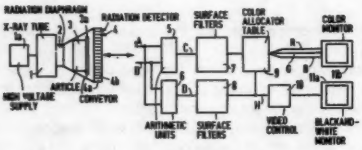
response to command signals from an operator, to move the structural member in one of two directions;
means for detecting contact between the structural member and an object;
a second power supply for the motor;
means, responsive to said means for detecting, for disabling said first power supply from applying electricity to said motor; and
means, responsive to said means for detecting, for connecting said second power supply to the motor to cause the motor to move the structural member away from contact with the object.

4,987,584

MATERIALS INSPECTION SYSTEM USING X-RAY IMAGING

Gerhard Doenges, Heidenrod-Kemel, Fed. Rep. of Germany, assignor to Heiman GmbH, Fed. Rep. of Germany

Filed Apr. 3, 1990, Ser. No. 503,670
Claims priority, application European Pat. Off., Apr. 6, 1989, 89106087.3
Int. Cl.[5] H05G *1/64*
U.S. Cl. 378—100 **5 Claims**



1. A materials inspection system comprising:
means for moving an article to be inspected through an x-ray beam;
means for irradiating said article in said x-ray beam with x-ray radiation of two different energies;
means for detecting x-rays attenuated by said article at said two different energies and for generating electrical signals corresponding thereto;
first channel means for processing said electrical signals from said means for detecting for generating a luminance signal;
second channel means for processing said electrical signals from said means for detecting for generating a materials information signal;
means for generating and displaying an image of said article;
means for controlling the color of said image based on said materials information signal; and
means for controlling the image brightness, color saturation and white content of said image based on said luminance signal.

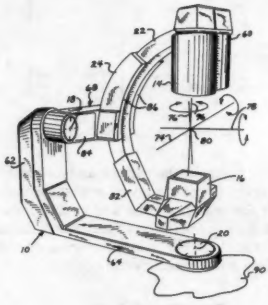
4,987,585

X-RAY POSITIONER FOR MULTI-AXIS PROFILING

Harold J. Kidd, Waukesha, and Paul R. Anderson, Milwaukee, both of Wis., assignors to General Electric Company, Milwaukee, Wis.

Continuation of Ser. No. 333,291, Apr. 4, 1989, abandoned. This application Jul. 25, 1990, Ser. No. 560,500
Int. Cl.[5] H05G *1/02*
U.S. Cl. 378—197 **5 Claims**

1. A diagnostic x-ray machine for making examinations of a human body comprising:
an L arm means for rotating on a first pivot about a first machine axis intersecting an isocenter, said L arm including a second pivot defining a second machine axis intersecting the isocenter and perpendicular to the first machine axis;
an offset arm means for rotating on the second pivot about the second machine axis, the offset arm including an arcuately curved guide collar;
a C arm means arcuately curved and carried by the curved guide collar for movement therealong, said C arm having first and second opposing ends, said ends revolving about a third machine axis during movement of the C arm relative to the curved guide collar, said third machine axis intersecting the isocenter;



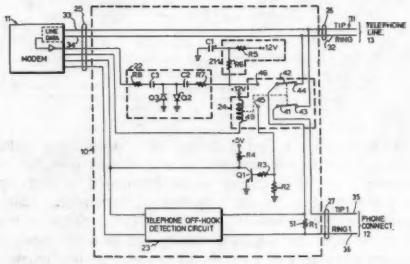
an x-ray source mounted on the first end of the C arm for directing radiation inward with respect to the third machine axis, along an image axis intersecting the isocenter; and
an image receiver means mounted on the second end of the C arm for receiving radiation from the x-ray source directed along the image axis.

4,987,586

MODEM-TELEPHONE INTERCONNECT

Allen E. Gross, Carrollton, and Marvin F. Malm, Dallas, both of Tex., assignors to Compaq Computer Corporation, Houston, Tex.

Filed Jul. 31, 1987, Ser. No. 80,404
Int. Cl.[5] H04M *11/00, 1/68*
U.S. Cl. 379—93 **7 Claims**



1. A circuit for interconnecting a modem and a telephone with a telephone line, comprising:
(a) a switch normally connecting the telephone to the telephone line;
(b) a telephone off-hook detection circuit; and
(c) a monitor circuit adapted to receive data signals from the modem,
the switch operative to receive a modem off-hook signal when the modem is in an off-hook condition, the switch being responsive to the modem off-hook signal to disconnect the telephone from the telephone line and connect the telephone to the monitor circuit, and
the detection circuit adapted to sense an off-hook condition at the telephone when the telephone is connected to the

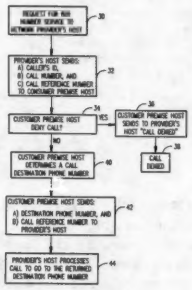
telephone line and operative to prevent the modem from assuming an off-hook condition when the telephone is connected to the telephone line and is in an off-hook condition.

4,987,587

METHOD AND APPARATUS FOR PROVIDING 800 NUMBER SERVICE

Charles H. Jolissaint, Sunnyvale, Calif., assignor to International Business Machines Corporation, Armonk, N.Y.

Filed Jul. 26, 1989, Ser. No. 385,899
Int. Cl.[5] H04M *3/42*
U.S. Cl. 379—94 **22 Claims**


REQUEST FOR 800 NUMBER SERVICE TO NETWORK PROVIDER'S HOST
30
PROVIDER'S HOST SENDS: A) CALLER'S ID, B) CALL NUMBER, AND C) CALL REFERENCE NUMBER TO CUSTOMER PREMISE HOST
32
CUSTOMER PREMISE HOST DENY CALL?
34
YES
CUSTOMER PREMISE HOST SENDS TO PROVIDER'S HOST "CALL DENIED"
36
NO
CALL DENIED
38
CUSTOMER PREMISE HOST DETERMINES A CALL DESTINATION PHONE NUMBER
40
CUSTOMER PREMISE HOST SENDS: A) DESTINATION PHONE NUMBER, AND B) CALL REFERENCE NUMBER TO PROVIDER'S HOST
42
PROVIDER'S HOST PROCESSES CALL TO GO TO THE RETURNED DESTINATION PHONE NUMBER
44

1. A method of processing an 800 number telephone call in an 800 number customer's system, the customer's system having a plurality of phones associated with 800 number destination phone numbers, the plurality of phones, being managed by a digital switch, the customer's system further including a customer's Host processor coupling to the digital switch, the customer's system further including, means for bidirectionally coupling the customer's Host processor to an 800 number network provider Host processor, the method comprising the steps of, in response to a caller dialing an 800 telephone number:

(a) transmitting from the 800 number, network provider Host processor to the customer's Host processor information expressive of the occurrence of the caller having dialed the number, 800 number;

(b) determining at the customer's Host processor an action to be taken in response to the caller having dialed the 800 number;

(c) transmitting from, the customer's Host processor to the network provider's Host processor information expressive of the determined action to be taken in response to the caller having dialed the 800 number; and,

if the customer's Host processor does not transmit the information expressive of the determined action within a predetermined interval of time the method includes a step of transmitting from the network provider's Host processor to the customer's Host processor default information including an indication that the network provider's Host processor has provided a default destination telephone number associated with the 800 number.

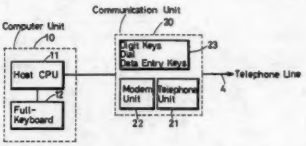
4,987,588

DATA TRANSMISSION PROCESSING MACHINE

Yoshitaka Fukuma, and Taiji Iizuka, both of Nara, Japan, assignors to Sharp Kabushiki Kaisha, Osaka, Japan

Continuation of Ser. No. 873,280, Jun. 9, 1986, abandoned, which is a continuation of Ser. No. 575,672, Jan. 31, 1984, abandoned. This application Sep. 19, 1989, Ser. No. 409,998
Claims priority, application Japan, Feb. 3, 1983, 58-17071
Int. Cl.[5] H04M *11/00*
U.S. Cl. 379—98 **4 Claims**

PRIOR ART



1. A communication device coupled between a telephone line and a host computer, said communication device operable in a telephone mode and a modem mode wherein during said telephone mode said communication device transmits and receives voice communication over said telephone line and during said modem mode said communication device transmits and receives processed data over said telephone line, said communication, device comprising:

voice communication means transmitting and receiving said voice communication over said telephone line;

full keyboard means functioning as a telephone dial providing dial data during said telephone mode and functioning as a data entry means providing input data during said modem mode;

modem means coupled to said host computer and said telephone line communicating said processed data therebetween;

mode selection means designating operation of said communication device in one of said telephone mode or said modem mode; and

control CPU means, coupled to said host computer, said full keyboard means, said modem means, and said mode selection means, said control CPU means operable in response to said mode selection means in

said telephone mode to disable said modem means and to provide said dial data as output along said telephone line and to enable said voice communication means to transmit and receive said voice communication over said telephone line, and

said modem mode to enable said modem means for communication of said processed data between said telephone line and said host computer and to couple said input data to said host computer whereby said host computer outputs said processed data to said modem means.

4,987,589

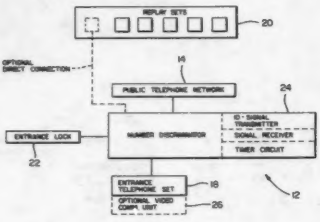
ENTRANCE TELEPHONE SYSTEM UTILIZING THE PUBLIC SUBSCRIBER TELEPHONE NETWORK

Anders E. Trell, Torkel Knutssonsg. 35, Stockholm, Sweden S-116 51

Continuation of Ser. No. 30,865, Feb. 25, 1987, abandoned. This application Jan. 9, 1989, Ser. No. 296,393
Claims priority, application Sweden, Jun. 27, 1985, 8503209
Int. Cl.[5] H04M *11/00*
U.S. Cl. 379—10.3 **12 Claims**

1. An entrance telephone installation adapted to be connected to a public telephone network, comprising: a number discriminator with line access to a public telephone network and a dialling ability for dialling predetermined telephone numbers over the public telephone network, said number

discriminator being addressable from an entrance telephone set for establishing a circuit to specific reply sets, said reply sets being adapted to facilitate signalling via a switched through circuit in the public telephone network to facilitate door lock opening, a specific ID-signal being sent to the public telephone network during a first time period after a completed switching operation to a specific reply set during a first predetermined period of time, the public telephone network being monitored by said number discriminator simultaneously during said first



time period with regard to digits entered from the reply set and transmitted via the public telephone network as a pulsed signal or multi-frequency signal, non-entering of digits at the reply set during said first time period resulting in disconnection of the estabilished circuit, detection by the number discriminator of at least one predetermined digit entered from the reply set during the first time period being interpreted by the number discriminator as specific commands which result in the number discriminator performing at least one resultant corresponding action.

4,987,590

MULTIPLE PARTY TELEPHONE CONTROL SYSTEM

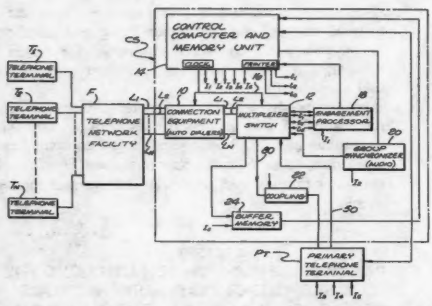
Ronald A. Katz, Los Angeles, Calif., assignor to First Data Resources Inc., Omaha, Nebr.

Continuation of Ser. No. 371,188, Jun. 26, 1989, Pat. No. 4,939,773. This application Jan. 26, 1990, Ser. No. 470,468

The portion of the term of this patent subsequent to Jul. 3, 2007, has been disclaimed.

Int. Cl.[5] H04M *3/56, 11/06*

U.S. Cl. 379—204 **21 Claims**



1. A multiple-party control system for use with a telephone facility to interface a primary terminal with a multiplicity of remote terminals through said telephone facility, said system comprising:

preliminary structure for calls at connected terminals to provide vocal information to persons at connected terminals;

gang holding structure for collectively communicating with persons at said connected terminals collectively as a group; and

controlled switch means for initially coupling individual terminals to said preliminary structure during an engagement phase of operation, subsequently connecting said terminals to said gang holding structure during a pending phase of operation and thereafter connecting said gang holding structure to said primary terminal for collectively receiving unilateral voice communication.

4,987,591

ELECTRONIC TELEPHONE APPARATUS ABLE TO SUPPLY SYNC CLOCK SIGNALS RELIABLY, AND METHOD OF CONTROLLING THE SUPPLY OF SYNC CLOCK SIGNALS

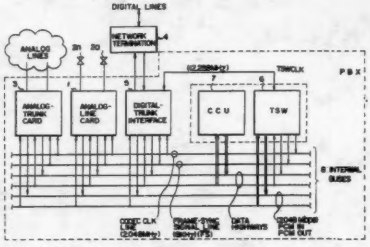
Eiji Ohtsuka, Hino, Japan, assignor to Kabushiki Kaisha Toshiba, Kawasaki, Japan

Filed Jun. 5, 1989, Ser. No. 361,517

Claims priority, application Japan, Jun. 6, 1988, 63-138716

Int. Cl.[5] H04Q *3/56*

U.S. Cl. 379—279 **9 Claims**



1. An electronic telephone apparatus comprising:

clock signal generating means for generating a first clock signal on the basis of a clock signal extracted from external digital line means,

oscillator means for generating a second clock signal having the same frequency as said first clock signal; and

switching means for monitoring abnormality of the first clock signal, selecting the first reference clock signal when no abnormality is found in the first clock signal, and selecting the second clock signal when abnormality is found in the first clock signal,

wherein said switching means comprises:

first frequency-dividing means for dividing the frequency of the first clock signal output from the clock signal generating means, to generate a signal having a specific frequency;

second frequency-dividing means for dividing the frequency of said second clock signal output from the oscillator means, thereby generating a signal having the same frequency as that of the signal generated by said first frequency-dividing means; and

detector means for comparing the signals output from said first and second frequency-dividing means, thereby detecting non-coincidence between the signals thus compared.

4,987,592

MICROPHONE BOOM ASSEMBLY FOR COMMUNICATION HEADSET

John E. Flagg, Worcester, Mass., assignor to David Clark Company Incorporated, Worcester, Mass.

Filed May 30, 1989, Ser. No. 357,771

Int. Cl.[5] H04M *1/05;* **H04R** *1/10*

U.S. Cl. 379—430 **2 Claims**

1. In a communication headset having a pair of housings containing earphones, a microphone, and a boom assembly

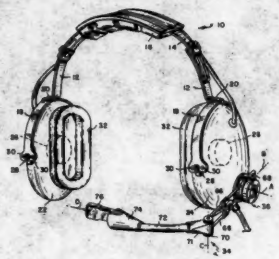
extending from one of said housings for adjustable supporting said microphone, said boom assembly comprising:

an elongated substantially rigid base section;

first means for connecting said base section to the said one of said housings in a manner permitting both rotation of said base section about a first axis and longitudinal translation of said base section in opposite directions along a second axis extending transversely with respect to said first axis;

an elongated flexible outer section having inner and outer ends;

a rigid intermediate section having inner and outer ends, the outer end of said intermediate section being joined to the



inner end of said outer section, and the inner end of said intermediate section being connected to said base section for rotation about a third axis spaced from said first axis and extending transversely with respect to said second axis; and

means at the outer end of said outer section for receiving said microphone, said outer section being both bendably and torsionally adjustable to achieve a selected position and angular orientation of said microphone with respect to said intermediate section, and said intermediate section being rotatable about said third axis without disturbing the thus achieved selected position and angular orientation.

4,987,593

ONE-SHOW BLIND SIGNATURE SYSTEMS

David Chaum, 14652 Sutton St., Sherman Oaks, Calif. 91403

Continuation of Ser. No. 384,092, Jul. 24, 1989, Pat. No. 4,914,698, which is a continuation of Ser. No. 168,802, Mar. 16, 1988, abandoned. This application Apr. 5, 1990, Ser. No. 504,878

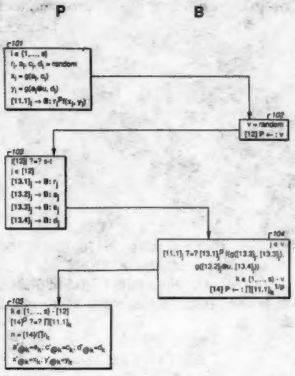
Int. Cl.[5] H04L *9/00*

U.S. Cl. 380—3 **13 Claims**

1. In a public-key digital signature system, the improvement comprising the steps of:

issuing digital signatures by an issuing party and the issuing party ensuring that with substantial probability each of the issued signatures contains identifying information;

showing at least one of said issued signatures to at least one checking party to allow the checking party to verify the digital signature property of the signatures shown while substantially concealing, from even cooperation of every checking party and said signature issuing party, the identifying information contained in signatures shown at most once; and



testing said shown signatures to yield with substantial probability said identifying information contained in signatures shown more than once.

4,987,594

STAND-ALONE UTILITY DEVICE WITH ANTITHEFT CODE WITH METHOD FOR ITS USE

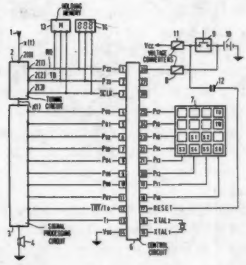
Derk J. C. Wassink, Eindhoven, Netherlands, assignor to U.S. Philips Corporation, New York, N.Y.

Filed Dec. 28, 1988, Ser. No. 290,978

Claims priority, application Netherlands, Jul. 7, 1988, 8801717

Int. Cl.[5] H04K *1/02, 3/00;* **G08B** *13/14*

U.S. Cl. 380—6 **3 Claims**



1. A stand-alone utility device for perceptible reproduction of signals supplied by a signal source, said utility device having means for deterring its theft and comprising:

reproducing means for receiving said signals;

storage means coupled to said reproducing means for storing a pre-programmed antitheft code;

means coupled to said storage means for generating a security command in response to an unauthorized use of said device;

control means comprising a program memory, coupled to said generating means and adapted to perform:

(a) a switch-on program in response to a switch-on command;

(b) a test program to establish whether a security command has occurred; and

(c) a jamming program, activated if said security com-

mand has occurred, for disturbing the quality of the signal reproduction;

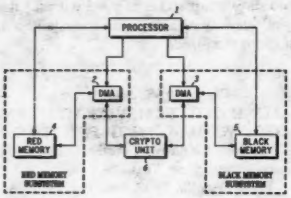
wherein said switch-on program, said test program and said jamming program are stored in said program memory.

4,987,595

SECURE CRYPTOGRAPHIC PROCESSOR ARRANGEMENT

Joseph T. Marino, Jr., Fountain Hills, and Ronald S. Core, Glendale, both of Ariz., assignors to Motorola, Inc., Schaumburg, Ill.

Filed Sep. 11, 1989, Ser. No. 405,157
Int. Cl.[5] H04L 9/02
U.S. Cl. 380—50 10 Claims



1. In a secure processor system, a secure processor arrangement for restricting access by a processor of said secure processor system to a memory subsystem, said secure processor arrangement comprising:

processor means for controlling write and read access to said memory subsystem;

said memory subsystem including first and second memory means, said first and second memory means being connected to said processor means, said first memory means operating under control of said processor means to store and to transmit plain text data, said second memory means operating under control of said processor means to store and to transmit cypher text data;

crypto means;

said first memory means being connected to said processor means for enabling said read and said write accesses by said processor means to said plain text data;

said memory subsystem further includes first direct memory access means connected to said first memory means, to said processor means and to said crypto means, said first direct memory access means operating, under control of said processor means, to transfer said plain text data from said first memory unit means directly to said crypto means for conversion to said cypher text data;

said second memory means being connected to said processor means for enabling said read access only by said processor means to said cypher text data; and

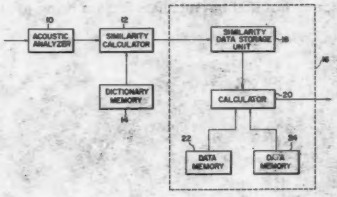
said memory subsystem further includes second direct memory access means connected to said second memory means, to said processor means and to said crypto means, said second direct memory assess means operating, under control of said processor means, to transfer said cypher text data from said second memory means directly to said crypto unit means for conversion to said plain text data.

4,987,596

KNOWLEDGE-GUIDED AUTOMATIC SPEECH RECOGNITION APPARATUS AND METHOD

Teruhiko Ukita, Fujisawa, Japan, assignor to Kabushiki Kaisha Toshiba, Kawasaki, Japan

Continuation of Ser. No. 841,954, Mar. 20, 1986, abandoned. This application Jun. 29, 1990, Ser. No. 546,709
Claims priority, application Japan, Mar. 25, 1985, 60-59880
Int. Cl.[5] G10L 5/00, 5/04, 5/06
U.S. Cl. 381—41 5 Claims



1. An acoustic pattern recognition apparatus for automatically recognizing continuous input speech, said apparatus comprising:

(a) acoustic analysis means for dividing an acoustic pattern of the continuous input speech at predetermined time intervals, so as to produce a plurality of frame data;

(b) dictionary memory means for storing reference acoustic patterns of phonemes in a selected language as reference phonemic labels;

(c) similarity calculation means, connected to said acoustic analysis means and said dictionary memory means, for calculating similarities between the frame data and the reference acoustic patterns, so as to produce a plurality of similarity data; and

(d) main processor means, connected to said similarity calculation means, for prestoring based upon a preliminary processing, as a phonetic/phonological condition in the processing of phonemic labels, phonetic/phonological data including both speech duration and connectability for phonemes in the selected language and for using both of said phonetic and phonological conditions, for extracting during the main processing, from among the reference phonemic labels to be compared with the frame data, reference phonemic labels which satisfy said phonetic/phonological condition with respect to the phonemes of the input speech in a first data memory which contain upper and lower limit values of the speech duration phonemes in a tabular format, and a second data memory which has prestored data as to the connectability of phonemes, for rejecting the similarity data of the reference phonemic labels which fail to satisfy said phonetic/phonological condition, and for allowing only the similarity data of the extracted reference phonemic labels to be subjected to similarity sum calculation to thereby generate a series of phonemic labels having a maximum similarity sum as a recognition result.

4,987,597

APPARATUS FOR CLOSING OPENINGS OF A HEATING AID OR AN EAR ADAPTOR FOR HEARING AIDS

Christof Haertl, Neunkirchen, Fed. Rep. of Germany, assignor to Siemens Aktiengesellschaft, Berlin & Munich, Fed. Rep. of Germany

Filed Oct. 3, 1988, Ser. No. 251,857
Claims priority, application Fed. Rep. of Germany, Oct. 5, 1987, 8713369
Int. Cl.[5] H04R 25/00
U.S. Cl. 381—69 4 Claims

1. An apparatus for closing openings in a housing of hearing

aids and parts of hearing aids, said openings being selected from a group consisting of sound entry, sound exit and aeration openings, said apparatus comprising a cap being mounted on the housing to close the opening, said cap having an opening for the transmission of sound and air through the cap, said cap

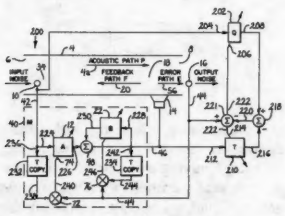
having means for preventing moisture, sweat and cerumen from passing through said opening in the cap, said means being a microporous membrane of a hydrophobic material extending across the opening of the cap, said material of the membrane being a microporous polytetraflourethylene.

4,987,598

ACTIVE ACOUSTIC ATTENUATION SYSTEM WITH OVERALL MODELING

Larry J. Eriksson, Madison, Wis., assignor to Nelson Industries, Stoughton, Wis.

Filed May 3, 1990, Ser. No. 518,569
Int. Cl.[5] G10K *11/16*; H04R *1/28*
U.S. Cl. 381—71 **23 Claims**



1. An active acoustic attenuation method for attenuating an undesirable acoustic wave, comprising:

sensing an input acoustic wave with an input transducer;

introducing a canceling acoustic wave from an output transducer to attenuate said input acoustic wave and yield an attenuated output acoustic wave;

sensing said output acoustic wave with an error transducer and providing an error signal;

adaptively modeling the acoustic path from said input transducer to said output transducer with a first adaptive filter model having a model input from said input transducer, an error input from said error transducer, and a model output outputting a correction signal to said output transducer to introduce said canceling acoustic wave;

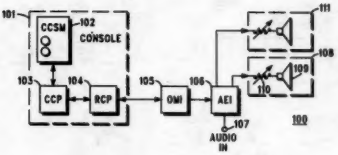
adaptively modeling the acoustic path from said input transducer to said error transducer with a second adaptive filter model having a model input from said input transducer, an error input, and a model output combined with the output of said error transducer to provide an error signal to said error input of said second model.

4,987,599

COMMUNICATION CONTROL CONSOLE CENTER WITH IMPROVED VOLUME CONTROL

Steven B. Most, Elmhurst; Hillel A. Meyers, Chicago; Susanne L. Dunsmore, Evanston, and Jeffrey J. Blanchette, Hoffman Estates, all of Ill., assignors to Motorola, Inc., Schaumburg, Ill.

Filed Mar. 29, 1989, Ser. No. 330,244
Int. Cl.[5] H03G *3/00*
U.S. Cl. 381—107 **8 Claims**



1. In a communication control console center that includes:

(a) audio input means for receiving audio signals from a plurality of communication resources to produce received audio signals;

(b) a console, operably associated with the audio input means, that includes:

1. selection means for selecting one of the plurality of communication resources to produce a selected communication resource and a plurality of non-selected communication resources; and

2. volume adjustment means for adjusting volume levels of at least some of the received audio signals from the selected communication resource when the volume adjustment means is activated;

(c) selected transducer means, operably associated with the console and the audio input means, for converting the received audio signals from the selected communication resource into audible signals;

(d) mix transducer means, operably associated with the console and the audio input means, for converting the received audio signals from at least some of the non-selected communication resources into audible signals;

(e) audio expansion means, operably associated with the audio input means, selected transducer means, the mix transducer means, and the console, for providing the received audio signals from the selected communication resource to the selected transducer means and for providing the received audio signals from the at least some of the non-selected communication resources to the mix transducer means; and

(f) an operator mux interface that is operably coupled to the audio expansion means and the console;

where the operator mux interface is improved to comprise:

volume setting means, operably associated with the volume adjustment means, for setting the volume level of the received audio signals from the selected communication resource at an initial preselected volume whenever the selected communication resource is selected independent of the volume adjustment means setting; and

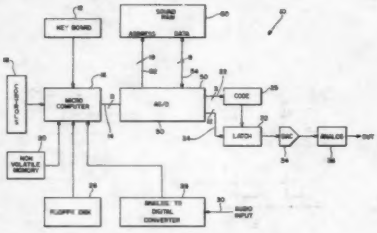
volume adjustment activating means, operably associated with the volume setting means, the selection means, and the volume adjustment means, for automatically activating the volume adjustment means while the selected communication resource is selected and when a volume adjustment is detected on the volume adjustment means.

4,987,600

DIGITAL SAMPLING INSTRUMENT

David P. Rossum, LaSelva Beach, Calif., assignor to E-Mu Systems, Inc., Scotts Valley, Calif.

Continuation of Ser. No. 874,250, Jun. 13, 1986, abandoned.
This application Aug. 3, 1989, Ser. No. 390,436
Int. Cl.[5] G10H 7/00
U.S. Cl. 381—118 1 Claim



1. A digital sampling keyboard instrument for encoding digital data samples having a certain number of bits representative of a particular musical sound having a first fidelity comprising:

means for creating differences between successive ones of said digital data samples,

means for creating the logarithm of said differences to form compressed logarithmic differential data which is compressed to a fewer number of bits than said certain number of bits,

means for storing said compressed logarithmic differential data,

means for adding time varying logarithmic encoded volume coefficients to said stored compressed logarithmic differential data to form added compressed logarithmic differential data,

means for creating the anti-logarithm of said added compressed logarithmic differential data, and

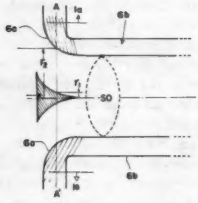
means for creating volumes called data samples from said anti-logarithm which approximate said digital data samples while maintaining fidelity similar to said first fidelity.

4,987,601

ACOUSTIC APPARATUS

Motoomi Goto, Hamamatsu, Japan, assignor to Yamaha Corporation, Hamamatsu, Japan

Filed Aug. 4, 1989, Ser. No. 389,737
Claims priority, application Japan, Aug. 10, 1988, 63-104947[U]
Int. Cl.[5] H05K 5/00
U.S. Cl. 381—159 8 Claims



1. An acoustic apparatus comprising:

a Helmholtz resonator having an open duct port and a cavity, an opening portion of the open duct port being extended in a horn-like shape to communicate with, with a smooth curvature, a surface on which the port is mounted,

a vibrator disposed in said Helmholtz resonator and

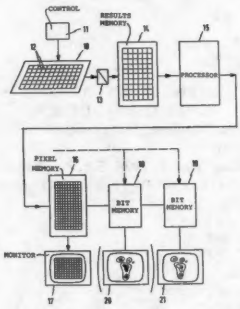
an air flow diffusing body which has a shape according to the shape of said port opening portion so as to have a cross-sectional size which gradually increases in a direction out of the duct port to provide an outer surface of the body with a smooth curvature, the body being arranged at the center of the extended port opening portion.

4,987,602

METHOD OF DISPLAYING HIGH-RESOLUTION DISTRIBUTIONS OF PHYSICAL PARAMETERS ON A MONITOR AND DEVICE FOR CARRYING OUT THE METHOD

Wolfgang Brunner, Ringenberg 175, 8999 Maierhöfen, Fed. Rep. of Germany, and Ludwig V. Zech, Argensee, 7964 Kisslegg, Fed. Rep. of Germany

Filed Apr. 28, 1989, Ser. No. 345,040
Claims priority, application Fed. Rep. of Germany, May 31, 1988, 3818534
Int. Cl.[5] G06K 9/00
U.S. Cl. 382—1 16 Claims



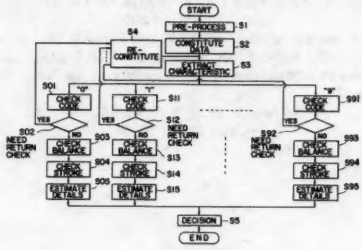
1. A method for displaying a high-resolution distribution of physical parameters in form of pressures or forces acting at right angles on a stage having a matrix of sensors, comprising the steps: measuring said parameters with said sensors having an electrical output signal, said parameters being displayed on a display monitor; converting said output signal to digital values when said output signal is an analog signal; storing digital values of each sensor in a respective address in a results memory; generating from the digital values stored in the results memory a first virtual image in form of a matrix of squares with sides of a first predetermined length and representing locations of said sensors, each stored digital value being associated with pixel values from a pixel memory; generating from the pixel values a second virtual image in form of a matrix of squares with sides of a second predetermined length differing from said first predetermined length, one virtual image being superimposed on the other virtual image; calculating each pixel value by a processor from a square area surrounding centrally said pixel value in said second virtual image by determining each area in said first virtual image; weighting each area with stored digital value in said first virtual image by forming products with areas of surrounding squares and summing all products; summing all areas of said surrounding squares; dividing the sum of all products by the sum of all areas of said surrounding squares and forming a quotient; storing the quotient in a corresponding address in said pixel memory; and displaying contents of said pixel memory on said display monitor.

4,987,603

RECOGNITION METHOD FOR LETTER PATTERNS

Kazuhiko Ohnishi; Shoji Miki; Yasuo Fujita; Hiroki Tsubota, all of Himeji, and Katsuji Uosaki, Kobe, all of Japan, assignors to Glory Kogyo Kabushiki Kaisha, Hyogo, Japan

Filed Sep. 22, 1988, Ser. No. 247,664
Int. Cl.[5] G06K 9/52
U.S. Cl. 382—25 15 Claims



1. A letter pattern recognition method comprising the steps of:

preprocessing character patterns;

extracting characteristic data for the character patterns according to elements including a loop, a straight line and an arc which have branches and nodes;

obtaining a center of gravity for each of the respective elements;

normalizing the character patterns by using the extracted characteristic data;

comparing the normalized character patterns with pre-registered classification codes by allotting relative positions of the loop, straight line and arc elements in accordance with information on the center of gravity thereof and determining if a return check is required depending upon the result of the comparison, and performing a return check and returning to the extracting step if a return check is required;

performing balance and stroke checking for the normalized patterns in the absence of the requirement for the return check, wherein the balance checking is performed by using a relationship of weight on the relative position and wherein the stroke checking is performed by checking a direction of the straight line elements, a rotational direction of the arc elements and a link structure of the elements; and

detail-classifying the normalized patterns in such a manner that an orientation of the arc elements, and a length ratio of the elements so as to thereby recognize the character patterns.

4,987,604

SECOND OPINION METHOD OF PATTERN RECOGNITION ERROR REDUCTION

Stephen F. Rouch, Royal Center, Ind., assignor to Delco Electronics Corporation, Kokomo, Ind.

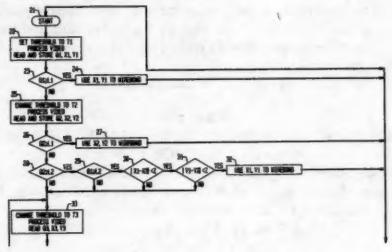
Filed Jun. 2, 1989, Ser. No. 360,680
Int. Cl.[5] G06K 9/68
U.S. Cl. 382—8 7 Claims

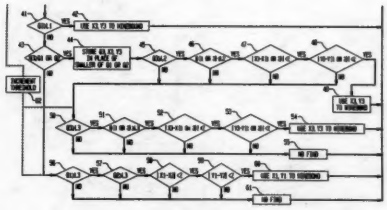
1. A method of operating a pattern recognition system which digitizes the image of a work item, using a selected threshold to determine a grey level to be digitized as black instead of white, compares the pixels of the digitized work item image with those of a digitized reference image stored in memory, and produces both the offset coordinates of the work item image relative to the reference image and a quality number representing the match between the pixels of the digitized work item image and those of the digitized reference image, said method comprising the steps of:

seeking a quality number on the basis of one grey level threshold;

accepting the offset coordinates associated with said quality number if said quality number exceeds a first quality reference level;

otherwise seeking another quality number on the basis of another grey level threshold;





accepting the offset coordinates associated with said other quality number if said other quality number equals or exceeds said first quality reference level;

otherwise comparing both of said quality numbers with a second lower quality reference level; and

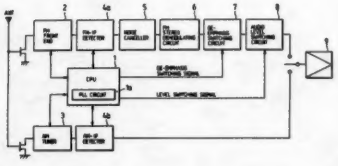
accepting the offset coordinates of one of said quality numbers if the offset coordinates of both quality numbers match one another within a predetermined tolerance.

4,987,605

RADIO RECEIVER INCORPORATING AUTOMATIC MEANS FOR SETTING BROADCAST STANDARD

Tetsuya Nose, Iwaki, Japan, assignor to Alpine Electronics Inc., Tokyo, Japan

Filed Jul. 12, 1989, Ser. No. 379,410
Claims priority, application Japan, Jul. 13, 1988, 63-174184
Int. Cl.[5] H04B 11/16, 1/16
U.S. Cl. 455—161 8 Claims



1. A radio receiver, being operable by means of a power supply switching means, for receiving broadcast signals, said

broadcast signals conforming to broadcast standards set by individual countries, said radio receiver comprising:

means for automatically detecting one of plurality of broadcast standards and controlling said radio receiver to receive broadcast signals conforming to a detected broadcast standard, said means for detecting and controlling comprising:

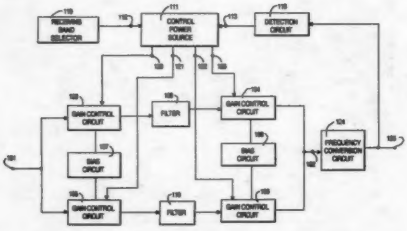
means activated automatically upon power being applied to said radio receiver via said power supply switching means for automatically searching a plurality of broadcast bands, said means for automatically searching using predetermined frequency steps to automatically search a first broadcast band to detect whether said first broadcast band conforms to one of said plurality of broadcast standards.

4,987,606

WIDE BAND TRANSMISSION SYSTEM WITH BIASING OF GAIN CONTROL CIRCUIT

Hiroaki Ozeki, Neyagawa; Seiji Sakashita, Yahata, and Ippei Kanno, Hirakata, all of Japan, assignors to Matsushita Electric Industrial Co., Ltd., Osaka, Japan

Filed Dec. 21, 1988, Ser. No. 287,088
Int. Cl.[5] H04B *1/16*
U.S. Cl. 455—188 **15 Claims**



1. A wide band transmission system for receiving via an input terminal a wide band signal containing a plurality of signals having different frequency bands from each other and selectively transmitting one of the plurality of signals according to a desired frequency band, said system comprising:

a plurality of parallel transmission paths coupled in parallel to the input terminal and each comprising a gain control means for controlling a gain of a corresponding transmission path and a filter means having a pass band which is different from that of the filter means in each of the other of the plurality of parallel transmission paths;

a receiving band selecting means for selecting one of the plurality of parallel transmission paths whose filter means has a pass band in which the desired frequency band exists and for producing a selection signal indicative of the thus selected transmission path; and

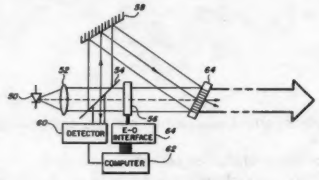
a control power source responsive to the selection signal for supplying to the gain control means in the selected transmission path a first control signal for controlling the gain of the selected transmission path so as to pass therethrough a signal of the desired frequency band, and for supplying the gain control means of each of the remaining transmission paths a second control signal for reducing the gains of the remaining transmission paths so as to suppress signals which are to be passed through the remaining transmission paths.

4,987,607

EFFICIENT DYNAMIC PHASEFRONT MODULATION SYSTEM FOR FREE-SPACE OPTICAL COMMUNICATIONS

G. Charmaine Gilbreath, Accokeek, and Frederic M. Davidson, Cockeysville, both of Md., assignors to The United States of America as represented by the Secretary of the Navy, Washington, D.C.

Filed Sep. 9, 1988, Ser. No. 242,678
Int. Cl.[5] H04B *10/04*
U.S. Cl. 455—618 **5 Claims**



1. An optical communications system for correcting in real-time the wavefront distortions of a signal beam from a coherent optical transmitting source, comprising:

means for partially collimating said distorted wavefront signal beam from said coherent optical transmitting source;

means responsive to said partially collimated distorted wavefront signal beam for splitting said partially collimated distorted wavefront signal beam into two beams known as a low intensity signal beam and a pump beam wherein said pump beam is of stronger intensity than said low intensity signal beam;

means for detecting and measuring said distortions in said distorted wavefront beam;

means responsive to said detecting and measuring means for analyzing said distortions and specifying a compensatory wavefront;

means for modifying said low intensity signal beam according to said specified compensatory wavefront to produce a compensated wavefront signal beam;

means for directing said pump beam towards an energy coupling means; and

said energy coupling means responsive to said compensated wavefront signal beam for coupling energy from said pump beam to said compensated wavefront signal beam wherein said compensated wavefront signal beam is amplified through transfer of energy from said pump beam thereby producing a corrected and intensity-enhanced communications beam.

DESIGN PATENTS

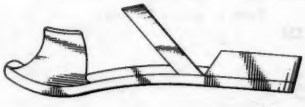
GRANTED JAN. 22, 1991

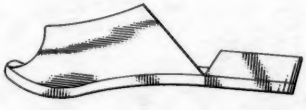
ERRATA

For CLASS	See PATENT NO.
D09-350	313,930
D09-351	313,931
D02-162	313,965

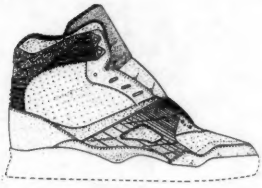
313,883
BIB FOR INFANTS, INVALIDS, OR THE LIKE
Margaret P. Fleming, P.O. Box 468, Somerset, Va. 22972
Filed Oct. 8, 1987, Ser. No. 105,693
Term of patent 14 years
U.S. Cl. D2—226

313,884
REMOVABLE SOLE FOR SPIKED SHOES
Douglas C. Beckley, Rte. 101, Box 303B, Ritzville, Wash. 99169
Filed Feb. 5, 1988, Ser. No. 152,752
Term of patent 14 years
U.S. Cl. D2—277

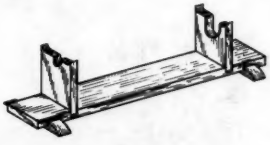




313,885
SHOE UPPER
Daniel Richard, Westlinn, Oreg.; James K. Tong, San Gabriel, Calif., and Peter Backus, Portland, Oreg., assignors to Avia Group International, Inc., Portland, Oreg.
Filed Feb. 13, 1990, Ser. No. 479,552
Term of patent 14 years
U.S. Cl. D2—314



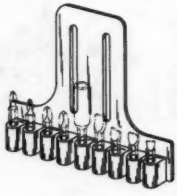
313,886
GUN SUPPORT CRADLE
Robert C. Southard, Box 94, Locust Grove, Ark. 72550
Filed Nov. 23, 1987, Ser. No. 123,995
Term of patent 14 years
U.S. Cl. D3—38



313,887
COW BAG
Catherine M. Senitt, R. R. #1, Carnarvon, Ontario, Canada K0M 1J0
Filed Aug. 9, 1988, Ser. No. 230,274
Claims priority, application Canada, Apr. 7, 1988, 07-04-88-18
Term of patent 14 years
U.S. Cl. D3—45

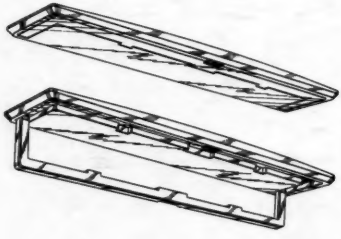
313,888
LUGGAGE CASE
David E. Workman, Evergreen, Colo., assignor to Samsonite Corporation, Denver, Colo.
Filed Mar. 3, 1987, Ser. No. 21,065
Term of patent 14 years
U.S. Cl. D3—77

313,889
HOLSTER FOR BITS
Ved P. Gakhar, and James M. Luebbers, both of Louisville, Ky., assignors to Vermont American Corporation, Louisville, Ky.
Filed Jul. 5, 1988, Ser. No. 215,440
Term of patent 14 years
U.S. Cl. D3—105



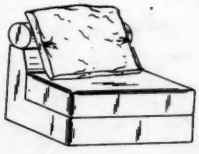
313,890
ELECTRIC SCRUBBING BRUSH
Robert M. Machuron, 71, rue Louis Desantels, 71230 Saint Vallier, France
Filed Oct. 15, 1987, Ser. No. 108,570
Claims priority, application France, Apr. 17, 1987, 87 2310
Term of patent 14 years
U.S. Cl. D4—102

313,891
RETRACTIBLE SUPPORT BAR
Gregory W. Kapp, Coloma, Mich., assignor to Innocorp Manufacturing, Inc., Coloma, Mich.
Filed Apr. 21, 1988, Ser. No. 184,157
Term of patent 14 years
U.S. Cl. D6—324

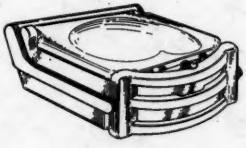


313,892
AUXILIARY BABY'S CHAIR
James M. Nichols, 4465 Bocca Way #175, Reno, Nev. 89502
Filed Sep. 11, 1987, Ser. No. 95,607
Term of patent 14 years
U.S. Cl. D6—333

313,893
SEAT
Hans Hopfer, Paris, France, assignor to Alex Synn AG, Cham, Switzerland
Filed Mar. 7, 1988, Ser. No. 165,162
Claims priority, application Hague, Sep. 7, 1987, DM/009.239
Term of patent 14 years
U.S. Cl. D6—334



313,894
COMBINED COLLAPSIBLE CHAIR AND CONTAINER
Paolo Tiramani, New York, N.Y., assignor to Fun Design, Inc., Duxbury, Mass.
Filed Nov. 25, 1987, Ser. No. 125,527
Term of patent 14 years
U.S. Cl. D6—336

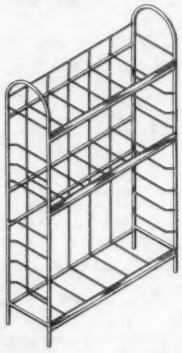


313,895
BENCH
Peter M. Yau Kee, Happy Valley, Hong Kong, assignor to Rosalco, Inc., Louisville, Ky.
Division of Ser. No. 295,566, Jan. 10, 1989. This application Oct. 30, 1989, Ser. No. 428,659
The portion of the term of this patent subsequent to Jul. 10, 2004, has been disclaimed.
Term of patent 14 years
U.S. Cl. D6—355

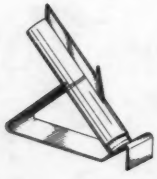
313,896
BARSTOOL
Howard Kaye, Greenwich, Conn., assignor to Designs for Leisure, Ltd., Mt. Kisco, N.Y.
Filed Jan. 13, 1988, Ser. No. 143,610
Term of patent 14 years
U.S. Cl. D6—365

313,897
CHAIR
Jonathan H. Crinion, 148 Montrose Avenue, Toronto, Ontario M6J 2T8, Canada
Filed Dec. 11, 1987, Ser. No. 132,544
Term of patent 14 years
U.S. Cl. D6—370

313,898
FLOWER STAND OR SIMILAR ARTICLE
Mike J. Vukelich, Sr., P.O. Box 5011, Richmond, Calif. 94805
Filed Sep. 21, 1987, Ser. No. 98,675
Term of patent 14 years
U.S. Cl. D6—405

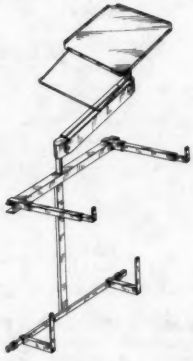


313,899
PRODUCT DISPLAY AND DISPENSER STAND
Steven W. Barker, Plano, and Richard E. McCathren, Dallas, both of Tex., assignors to Summers Group, Dallas, Tex.
Filed Dec. 24, 1987, Ser. No. 137,654
Term of patent 14 years
U.S. Cl. D6—408

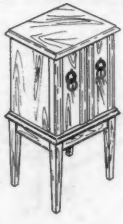


313,900
BLANKET RACK
Peter M. Yau Kee, Happy Valley, Hong Kong, assignor to Rosalco, Inc., Louisville, Ky.
Division of Ser. No. 371,028, Jun. 23, 1989. This application Jan. 26, 1990, Ser. No. 471,360
Term of patent 14 years
U.S. Cl. D6—410

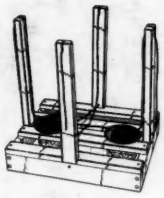
313,901
COMPUTER STAND WITH A SWIVEL ARM
Antonius F. M. Bende, Amsterdam, Netherlands, assignor to Publibox Advertising V.O.F., Amsterdam, Netherlands
Filed Dec. 9, 1987, Ser. No. 130,732
Claims priority, application Hague, Jun. 12, 1987, 62225-00
Term of patent 14 years
U.S. Cl. D6—429



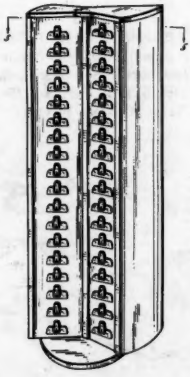
313,902
JEWELRY ARMOIRE
Peter M. Yau Kee, Happy Valley, Hong Kong, assignor to Rosalco, Inc., Louisville, Ky.
Filed Jan. 26, 1989, Ser. No. 302,219
Term of patent 14 years
U.S. Cl. D6—446



313,903
RACK FOR HOLDING AND BUNDLING NEWSPAPERS
Olle Humble, Täppstigen 4, S-181 41 Lidingö , Sweden
Filed Nov. 18, 1987, Ser. No. 129,888
Claims priority, application Sweden, May 25, 1987, 87-1235
Term of patent 14 years
U.S. Cl. D6—449



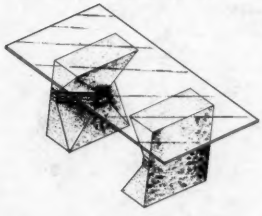
313,904
DISPLAY RACK
Morton Nyman, 1615 W. 27th St., and Michael Nyman, 5151 Collins Ave., both of Miami Beach, Fla. 33140
Filed Jan. 28, 1987, Ser. No. 7,815
Term of patent 14 years
U.S. Cl. D6—457



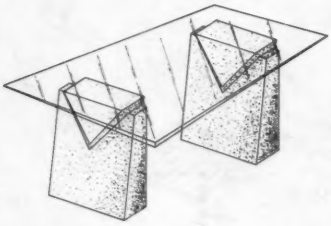
313,905
MAGAZINE RACK
Peter M. Yau Kee, Happy Valley, Hong Kong, assignor to Rosalco, Inc., Louisville, Ky.
Division of Ser. No. 295,566, Jan. 10, 1989, Pat. No. D. 309,536.
This application Nov. 20, 1989, Ser. No. 428,651
The portion of the term of this patent subsequent to Jan. 29, 2005, has been disclaimed.
Term of patent 14 years
U.S. Cl. D6—462

313,906
HOLDER FOR MOUNTING AND STORING EARRINGS
Murl Lublin, 5813 Penfield Ave., Woodhills, Calif. 91367
Filed Nov. 5, 1987, Ser. No. 116,890
Term of patent 14 years
U.S. Cl. D6—467

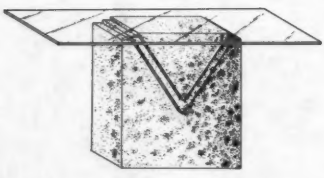
313,907
TABLE
Isaac Kubryk, 6161 E. Hwy. 12, Lodi, Calif. 95240
Filed Apr. 4, 1988, Ser. No. 177,022
Term of patent 14 years
U.S. Cl. D6—480



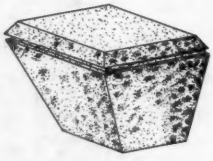
313,908
TABLE
Isaac Kubryk, 6161 E. Hwy. 12, Lodi, Calif. 95240
Filed Apr. 4, 1988, Ser. No. 177,007
Term of patent 14 years
U.S. Cl. D6—480



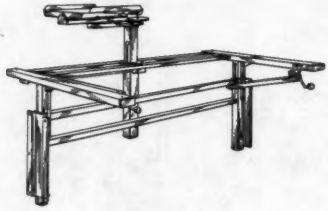
313,909
TABLE
Isaac Kubryk, 6161 E. Hwy. 12, Lodi, Calif. 95240
Filed Apr. 4, 1988, Ser. No. 177,017
Term of patent 14 years
U.S. Cl. D6—486



313,910
TABLE
Isaac Kubryk, 6161 E. Hwy. 12, Lodi, Calif. 95240
Filed Apr. 4, 1988, Ser. No. 177,020
Term of patent 14 years
U.S. Cl. D6—486

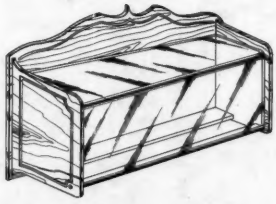


313,911
DESK FRAME
John E. Grout, Castlecrag, Australia, assignor to Ergonomic Equipment Pty. Ltd., Marrickville, Australia
Filed Mar. 27, 1987, Ser. No. 32,075
Claims priority, application Australia, Oct. 8, 1986, 7010/86
Term of patent 14 years
U.S. Cl. D6—491

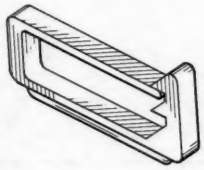


313,912
SUNSHIELD ATTACHMENT FOR AN INFANT CARRIER
Sharon B. Kosciusko, and David B. Kosciusko, both of 415 Diamond Hill Rd., Warwick, R.I. 02886
Filed Dec. 6, 1988, Ser. No. 280,535
Term of patent 14 years
U.S. Cl. D6—500

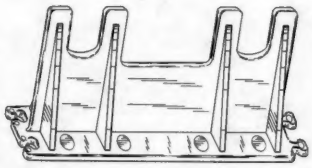
313,913
FOLDED PAPER TOWEL DISPENSER
John A. Richter, Cincinnati, Ohio, and Benito J. Hermann, Jr., Charlotte, N.C., assignors to Serendee, Inc., Cincinnati, Ohio
Filed Oct. 6, 1988, Ser. No. 254,127
Term of patent 14 years
U.S. Cl. D6—522



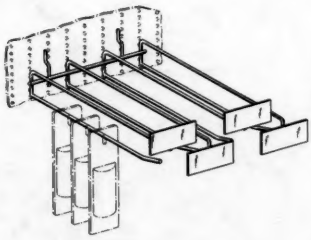
313,914
TUBE SQUEEZER
Robert C. Tribbey, P.O. Box 652, Knox City, Tex. 79529
Filed Jul. 17, 1989, Ser. No. 380,262
Term of patent 14 years
U.S. Cl. D6—541



313,915
SKI SUPPORT
Marchelle Adams, 26 Dover Ct., San Carlos, Calif. 94070, and Mark Degenhardt, 1550 Frontera Way #305, Millbrae, Calif. 94030
Filed May 16, 1989, Ser. No. 352,457
Term of patent 14 years
U.S. Cl. D6—552

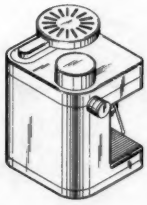


313,916
PEGBOARD-ATTACHED MERCHANDISE DISPLAY HOLDER
Jacob R. Ballard, Lincolnton, N.C., assignor to Vermont American Corporation, Louisville, Ky.
Filed Mar. 13, 1989, Ser. No. 323,546
Term of patent 14 years
U.S. Cl. D6—572

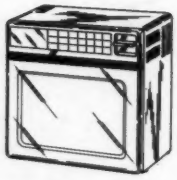


313,917
COMPUTER KEYBOARD SUPPORTING LAP CUSHION
Louis J. Valliere, 830 Temple Ave., Long Beach, Calif. 90804
Filed Nov. 22, 1988, Ser. No. 274,950
Term of patent 14 years
U.S. Cl. D6—601

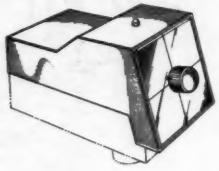
313,918
ELECTRIC COFFEE MAKER
Domingo F. A. Bolivar, Durango Vizcaya, Spain, assignor to Oficina de Investigacion Agrupada, S.A., Guipuzcoa, Spain
Division of Ser. No. 145,186, Jan. 19, 1988. This application Mar. 26, 1990, Ser. No. 499,059
Claims priority, application Spain, Aug. 17, 1987, 113763
Term of patent 14 years
U.S. Cl. D7—309

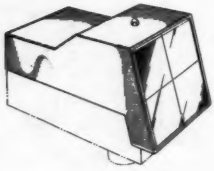


313,919
MICROWAVE OVEN
Masahito Naito, Kokubunji; Toshiro Higa, Hino; Tetsuro Aobori, Kunitachi; Eiichi Kubota, Tokyo, and Takeichi Obata, Hino, all of Japan, assignors to Hitachi Heating Appliances Co., Ltd., Kashiwa, Japan
Filed Jun. 20, 1986, Ser. No. 876,900
Claims priority, application Japan, Dec. 26, 1985, 60-54317
The portion of the term of this patent subsequent to Oct. 31, 2003, has been disclaimed.
Term of patent 14 years
U.S. Cl. D7—351

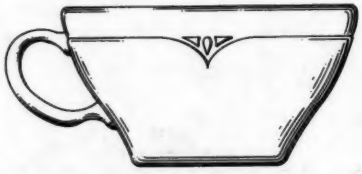


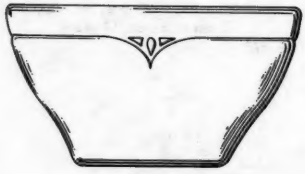
313,920
MULTI-FLAVOR DISPENSING VALVE COVER
Arthur G. Rudick, Marietta, and John E. Varrieur, Atlanta, both of Ga., assignors to The Coca-Cola Company, Atlanta, Ga.
Filed Mar. 4, 1988, Ser. No. 165,669
Term of patent 14 years
U.S. Cl. D7—398



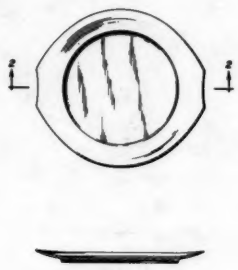


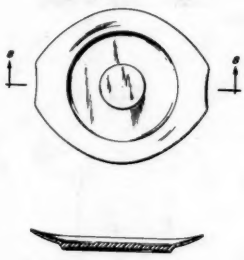
313,921
CUP OR SIMILAR ARTICLE
Steve A. Unger, Manlius, N.Y., assignor to Syracuse China Corporation, Syracuse, N.Y.
Filed Mar. 3, 1988, Ser. No. 163,932
Term of patent 14 years
U.S. Cl. D7—509



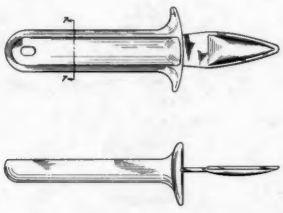


313,922
PLATE OR SIMILAR ARTICLE
Ludwig Scherer, Luxembourg, Luxembourg, assignor to Villeroy & Boch S.A.R.L., Luxembourg, Luxembourg
Filed Jan. 22, 1988, Ser. No. 146,804
Term of patent 14 years
U.S. Cl. D7—545





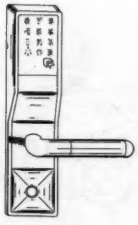
313,923
CLAM AND OYSTER KNIFE
William N. Poe, Jr., 117 Chisolm Trail, Greenville, S.C. 29607
Filed Mar. 10, 1988, Ser. No. 166,416
Term of patent 14 years
U.S. Cl. D7—693



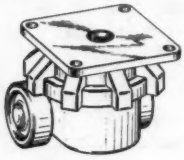
313,924
GRAPEVINE SPRING SUPPORTING HANGER
Jack L. Evans, 136 Calle Aruba, Palm Springs, Calif. 92264
Filed Jul. 25, 1988, Ser. No. 223,754
Term of patent 14 years
U.S. Cl. D8—1

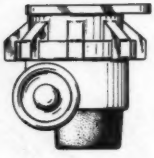
313,925
REVERSABLE ADJUSTABLE WRENCH
Richard E. Cone, Dayton, Ohio, assignor to SPE Investments, Inc. and Midwest Tool and Cutlery Company, both of Sturgis, Mich.
Filed Jun. 6, 1988, Ser. No. 203,018
Term of patent 14 years
U.S. Cl. D8—22

313,926
COMBINED HANDLE AND ESCUTCHEON WITH LOCK
Jean-Jacques Kautt, Strasbourg, France, assignor to Ferco International, Sarrebourg, France
Filed Oct. 13, 1987, Ser. No. 107,038
Claims priority, application France, Apr. 13, 1987, 872,510
Term of patent 14 years
U.S. Cl. D8—301

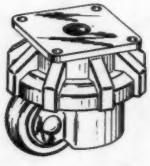


313,927
DOUBLE WHEEL CASTOR WITH STABILIZER AND VIBRATION DAMPER FOR TRANSPORT OF HEAVY MACHINES
Masaru Orii, Tokyo, Japan, assignor to Kabushikigaisha Orii, Kanagawa, Japan
Filed Apr. 22, 1988, Ser. No. 184,624
Claims priority, application Japan, Oct. 27, 1987, 62-43847
Term of patent 14 years
U.S. Cl. D8—375





313,928
SINGLE WHEEL CASTOR WITH STABILIZER AND VIBRATION DAMPER FOR TRANSPORT OF HEAVY MACHINES
Masaru Orii, Tokyo, Japan, assignor to Kabushikigaisha Orii, Kanagawa, Japan
Filed Apr. 22, 1988, Ser. No. 184,623
Claims priority, application Japan, Oct. 27, 1987, 62-43848
Term of patent 14 years
U.S. Cl. D8—375

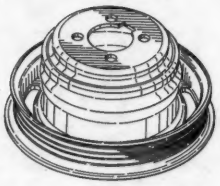


313,929
CORD CLAMP
Gerhard Fildan, Dr.-Körner-Str. 64, Trumau, Austria
Filed Nov. 18, 1988, Ser. No. 273,867
Term of patent 14 years
U.S. Cl. D8—395

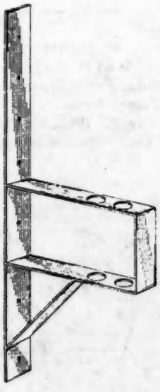
313,930
BOTTLE
Randy L. Martin, Box 1132, Wynard, Canada S0A 4T0
Filed Aug. 25, 1987, Ser. No. 89,252
The portion of the term of this patent subsequent to Jan. 15, 2005, has been disclaimed.
Term of patent 14 years
U.S. Cl. D9—350

313,931
BOTTLE
Jean Malvoisin, Hurigny, France, assignor to Etablissements V.J.F., France
Filed Jun. 11, 1987, Ser. No. 60,436
Claims priority, application France, Dec. 12, 1986, 866.601
Term of patent 14 years
U.S. Cl. D9—351

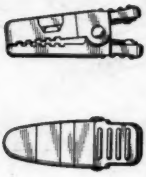
313,932
POLY-V PULLEY
Toshiaki Kanemitsu, Kobe, Japan, assignor to Kabushiki Kaisha Kanemitsu, Akashi, Japan
Filed Sep. 6, 1988, Ser. No. 240,249
Term of patent 14 years
U.S. Cl. D8—360



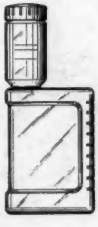
313,933
WALL BRACKET
Robert T. Petley, 7801 E. Gray Rd., Suite 1, Scottsdale, Ariz. 85260
Filed Apr. 7, 1988, Ser. No. 179,900
Term of patent 14 years
U.S. Cl. D8—373



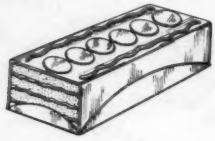
313,934
CORD CLIP
Shinroku Nakao, Kanagawa; Yoshiyasu Ishii, and Hiraku Kusubayashi, both of Tokyo, all of Japan, assignors to Combi Corporation, Tokyo, Japan
Filed Sep. 6, 1989, Ser. No. 403,504
Claims priority, application Japan, Mar. 14, 1989, 1-8967
Term of patent 14 years
U.S. Cl. D8—395



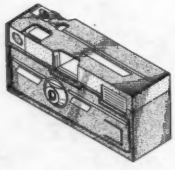
313,935
BOTTLE
Alan N. Miller, New City, N.Y., assignor to Ipco Corporation, White Plains, N.Y.
Filed Mar. 21, 1989, Ser. No. 326,874
Term of patent 14 years
U.S. Cl. D9—375



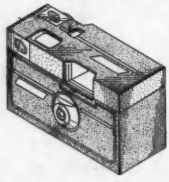
313,936
PACKAGE FOR CONFECTIONERY PRODUCTS
Pietro Ferrero, Brussels, Belgium, assignor to Soremartec, Watermael-Boitsfort, Belgium
Filed Nov. 29, 1988, Ser. No. 278,267
Claims priority, application Italy, May 31, 1988, 53189/88[U]
Term of patent 14 years
U.S. Cl. D9—418



313,937
PACKAGE FOR A DISPOSABLE CAMERA
Takuya Arai, Tokyo, Japan, assignor to Fuji Photo Film Co., Ltd., Kanagawa, Japan
Division of Ser. No. 195,957, May 17, 1988. This application Apr. 6, 1990, Ser. No. 505,523
Claims priority, application Japan, Feb. 27, 1988, 63-7916
Term of patent 14 years
U.S. Cl. D9—432



313,938
PACKAGE FOR A DISPOSABLE CAMERA
Takuya Arai, Tokyo, Japan, assignor to Fuji Photo Film Co., Ltd., Kanagawa, Japan
Division of Ser. No. 195,957, May 17, 1988. This application Apr. 6, 1990, Ser. No. 505,524
Claims priority, application Japan, Feb. 27, 1988, 63-7915
Term of patent 14 years
U.S. Cl. D9—432

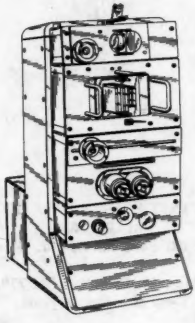


313,939
WATCH
Emile M. F. Benoit-Pequignet, Fournets-Luisans, France, assignor to Montres Emile Péquignet, Morteau, France
Filed Aug. 13, 1987, Ser. No. 85,065
Claims priority, application France, Feb. 13, 1987, 871,150
Term of patent 14 years
U.S. Cl. D10—32

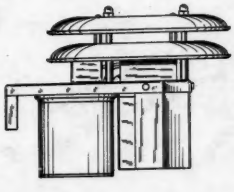
313,940
WRIST WATCH
Eric Bonnet, La Chaux de Fonds, Switzerland, assignor to ECO Swiss S.p.A., Milan, Israel
Filed Nov. 12, 1987, Ser. No. 119,419
Claims priority, application Int'l Pat. Institute, May 12, 1987, DM/008 632
Term of patent 14 years
U.S. Cl. D10—32

313,941
WRIST WATCH
Masamichi Wakamatsu, Fussa, Japan, assignor to Casio Computer Co., Ltd., Tokyo, Japan
Filed Aug. 31, 1987, Ser. No. 91,521
Term of patent 14 years
U.S. Cl. D10—38

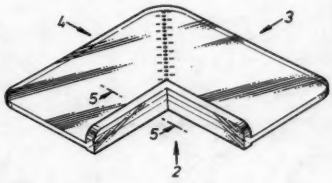
313,942
MEASURING DEVICE FOR TEXTILE LABORATORIES
Hans-Rudolf Fellmann, Wagen, and Christophe Apothéloz, Maschwanden, both of Switzerland, assignors to Zellweger Uster Ltd., Uster, Switzerland
Filed Apr. 8, 1987, Ser. No. 35,701
Claims priority, application Switzerland, Oct. 16, 1986, 115466
Term of patent 14 years
U.S. Cl. D10—46



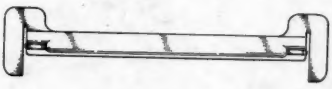
313,943
HUMIDITY DETECTOR
Clifton W. Brown, East Lansing; Robert D. Kriegel, Lansing, and Max R. Olinger, Grand Ledge, all of Mich., assignors to Neogen Corporation, Lansing, Mich.
Filed Jul. 11, 1988, Ser. No. 217,271
Term of patent 14 years
U.S. Cl. D10—56



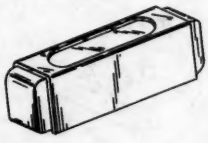
313,944
LINE MARKING GAUGE
Christopher J. Longridge, Mimosa Cottage, Swains Road, Bembridge, Isle of Wight, England
Filed Oct. 7, 1988, Ser. No. 254,783
Claims priority, application United Kingdom, Apr. 13, 1988, 8808749.9
Term of patent 14 years
U.S. Cl. D10—64



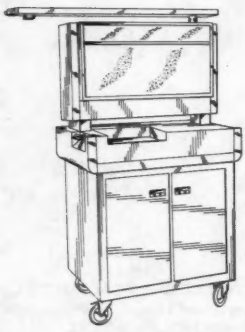
313,945
ELECTRICAL BOX PLACEMENT GAUGE
Dennis E. Thomas, and Larry L. Farthing, both of 17055 San Jose St., Granada Hills, Calif. 91344
Filed Oct. 17, 1988, Ser. No. 258,981
Term of patent 14 years
U.S. Cl. D10—64



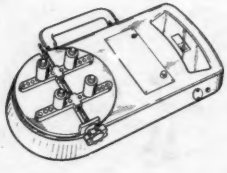
313,946
MAGNETIC ATTACHMENT FOR TAPE MEASURE
Marko Makar, 7-7883 Knight Street, Vancouver, British Columbia V5P 2X5, Canada
Filed Feb. 2, 1988, Ser. No. 151,078
Term of patent 14 years
U.S. Cl. D10—72



313,947
COMBINED ENGINE ANALYZER AND CART
James R. Shaffer, Mount Prospect, and Lee F. Radtke, Lake Zurich, both of Ill., assignors to Sun Electric Corporation, Crystal Lake, Ill.
Filed Jan. 28, 1987, Ser. No. 8,406
The portion of the term of this patent subsequent to Jan. 15, 2005, has been disclaimed.
Term of patent 14 years
U.S. Cl. D10—75

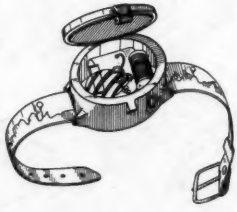


313,948
DIGITAL READOUT TORQUE TESTER
Thomas M. McDevitt, 4009 Beechway Blvd., Toledo, Ohio 43614
Filed Apr. 18, 1988, Ser. No. 182,047
Term of patent 14 years
U.S. Cl. D10—83



313,949
FUEL GAUGE
Nicholas M. G. Fekete, Richardson, Tex., assignor to Rochester Gauges, Inc., Dallas, Tex.
Filed Apr. 27, 1988, Ser. No. 186,798
Term of patent 14 years
U.S. Cl. D10—101

313,950
WRIST WORN INFLATABLE BALLOON DISTRESS MARKER
Alice M. Groce, 3800 Flatt Shoals Rd., #9-F, Decator, Ga. 30034
Filed Nov. 14, 1988, Ser. No. 270,128
Term of patent 14 years
U.S. Cl. D10—109

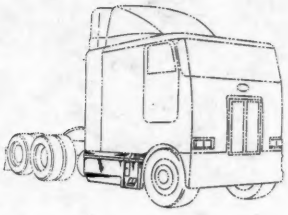


313,951
WHISTLE
Michael Mizisko, 182 Forge Rd., Jamesburg, N.J. 08831
Filed Feb. 9, 1989, Ser. No. 307,986
Term of patent 14 years
U.S. Cl. D10—119

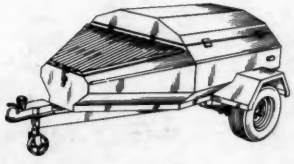
313,952
PELICAN HOLIDAY ORNAMENT
William C. Hooper, 1534 High Bluff Dr., Largo, Fla. 33540
Filed Mar. 30, 1987, Ser. No. 32,097
Term of patent 14 years
U.S. Cl. D11—127

313,953
SLIDER FOR SLIDE FASTENERS
Hiroo Minami, Uozu, Japan, assignor to Yoshida Kogyo K. K., Tokyo, Japan
Filed Dec. 7, 1988, Ser. No. 281,008
Claims priority, application Japan, Aug. 12, 1988, 63-32248
Term of patent 14 years
U.S. Cl. D11—221

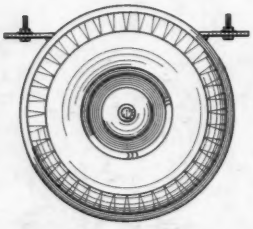
313,954
AERODYNAMIC SIDE SKIRT FOR A TRUCK
Robert F. Fingerle, Fremont, Calif., assignor to Paccar Inc, Bellevue, Wash.
Filed Dec. 10, 1987, Ser. No. 130,964
Term of patent 14 years
U.S. Cl. D12—96

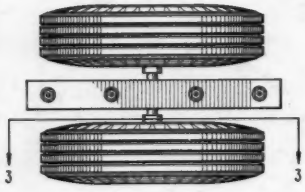


313,955
TRAILER
Jacobus C. van der Merwe, 801 Beechwood Dr., Kingsport, Tenn. 37663, and Lucas C. van der Merwe, 205 Pendleton Rd., Blountville, Tenn. 37617
Filed Jul. 19, 1988, Ser. No. 221,238
Term of patent 14 years
U.S. Cl. D12—102

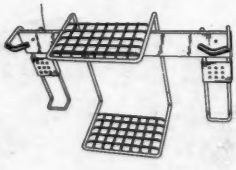


313,956
IMPACT SOFTENING UNIT FOR ATTACHMENT TO THE DRAW BAR OF A TRAVEL TRAILER
Donald R. Hoyt, and J. W. Hoyt, both of 13806 Windmill Cir., Pflugerville, Tex. 78660
Filed Nov. 3, 1988, Ser. No. 266,143
Term of patent 14 years
U.S. Cl. D12—106





313,957
WALL-MOUNTED BICYCLE STORAGE RACK
Steven W. Martinell, Vancouver, Wash., and Henry Y. Chin, Beaverton, Oreg., assignors to Racor, Inc., Portland, Oreg.
Filed Jan. 6, 1989, Ser. No. 294,176
Term of patent 14 years
U.S. Cl. D12—115



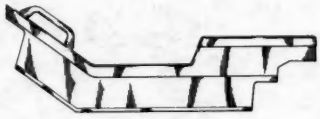
313,958
MOTORCYCLE TIRE
Toshiaki Kobayashi, and Katsuya Narumi, both of Tokyo, Japan, assignors to Bridgestone Corporation, Tokyo, Japan
Filed May 2, 1988, Ser. No. 189,504
Claims priority, application Japan, Dec. 15, 1987, 62-50938
Term of patent 14 years
U.S. Cl. D12—136

313,959
MOTORCYCLE TIRE
Toshiaki Kobayashi, and Atsushi Tomura, both of Tokyo, Japan, assignors to Bridgestone Corporation, Tokyo, Japan
Filed Apr. 22, 1988, Ser. No. 184,869
Claims priority, application Japan, Oct. 27, 1987, 62-43634
Term of patent 14 years
U.S. Cl. D12—145

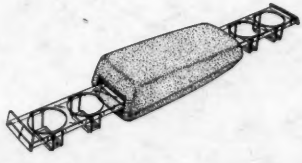
313,960
AUTOMOBILE TIRE
Tetsuhiro Fukumoto, Hyogo, Japan, assignor to Sumitomo Rubber Industries, Ltd., Hyogo, Japan
Filed Dec. 14, 1988, Ser. No. 284,443
Claims priority, application Japan, Jun. 15, 1988, 63-23739
Term of patent 14 years
U.S. Cl. D12—146

313,961
AUTOMOBILE TIRE
Yoshihiko Hasegawa, Hyogo, Japan, assignor to Sumitomo Rubber Industries, Ltd., Hyogo, Japan
Filed Apr. 29, 1988, Ser. No. 187,883
Claims priority, application Japan, Oct. 31, 1987, 62-44700
Term of patent 14 years
U.S. Cl. D12—151

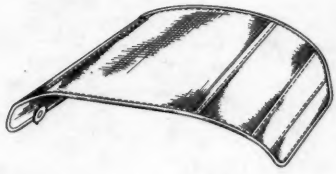
313,962
VEHICLE CONSOLE
Peter C. Haag, Fonthill; Donald G. Jones, Wainfleet, both of Canada; William E. Crookes, Waldwick, N.J., and Cristian J. Felix, Flushing, N.Y., assignors to Deere & Company, Moline, Ill.
Filed Sep. 16, 1988, Ser. No. 244,426
Term of patent 14 years
U.S. Cl. D12—155



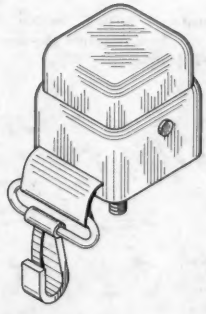
313,963
COMBINED AUTOMOBILE ARMREST AND CUP HOLDER
Anders Gunnarsson, Sätila, and Lars Strandäng, Gothenburg, both of Sweden, assignors to Aktiebolaget Volvo, Gothenburg, Sweden
Filed May 2, 1989, Ser. No. 347,382
Claims priority, application Sweden, Nov. 23, 1988, 88-2682
Term of patent 14 years
U.S. Cl. D12—155



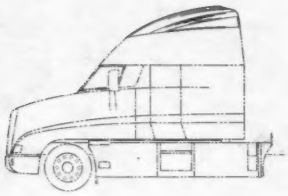
313,964
AUTOMOBILE PASSENGER COMPARTMENT COVER
Kip L. Fuller, Littleton, Colo., assignor to Innovision Technologies Group, Inc., Denver, Colo.
Filed Mar. 14, 1988, Ser. No. 167,458
Term of patent 14 years
U.S. Cl. D12—156

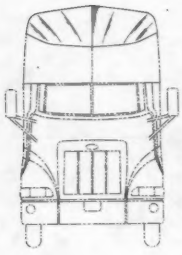


313,965
RECOIL SAFETY STRAP
Ira R. Sluss, Jr., Rte. #87, Box 119, Jumping Branch, W. Va. 25969
Filed Jul. 7, 1988, Ser. No. 216,240
Term of patent 14 years
U.S. Cl. D2—162

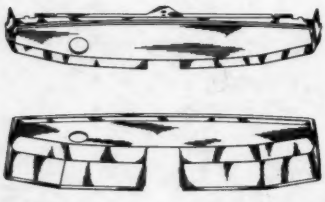


313,966
TRUCK ROOF FAIRING
Huston Marlowe, Orinda, and John Lindsley, Felton, both of Calif., assignors to Paccar Inc., Bellevue, Wash.
Filed Sep. 15, 1988, Ser. No. 245,068
Term of patent 14 years
U.S. Cl. D12—181

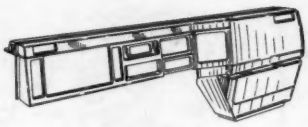




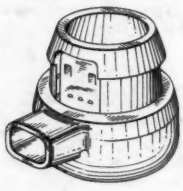
313,967
VEHICLE DASHBOARD
Peter C. Haag, Fonthill; Donald G. Jones, Wainfleet, both of Canada; William E. Crookes, Waldwick, N.J., and Cristian J. Felix, Flushing, N.Y., assignors to Deere & Company, Moline, Ill.
Filed Sep. 16, 1988, Ser. No. 244,428
Term of patent 14 years
U.S. Cl. D12—192



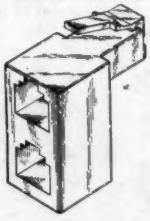
313,968
INSTRUMENT PANEL
Ronald N. Brunger, and Ramon R. Vasquez, both of Fort Wayne, Ind., assignors to Navistar International Transportation Corp., Chicago, Ill.
Filed Dec. 12, 1988, Ser. No. 283,763
Term of patent 14 years
U.S. Cl. D12—192



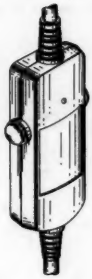
313,969
ELECTRICAL CONNECTOR
Jacques Lacroix, 12 Allee de la Pommeraie, Bievres, France
Filed May 5, 1987, Ser. No. 46,310
Claims priority, application France, Nov. 7, 1986, 86 5896
Term of patent 14 years
U.S. Cl. D13—133



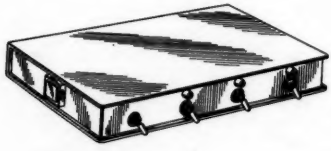
313,970
ELECTRICAL ADAPTOR
Stuart J. Reeves, St. Helens, England, assignor to ITT Industries Limited, Basingstoke, United Kingdom
Filed Jun. 8, 1988, Ser. No. 202,864
Claims priority, application United Kingdom, Dec. 10, 1987, 1047143
Term of patent 14 years
U.S. Cl. D13—147



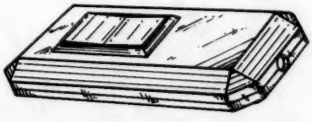
313,971
GROUND FAULT CIRCUIT INTERRUPTER
Saul Rosenbaum, East Meadow; Sergius P. Krzyzanowski, Flushing, and David Y. Chan, Bellerose, all of N.Y., assignors to Leviton Manufacturing Co., Inc., Little Neck, N.Y.
Filed Oct. 3, 1988, Ser. No. 253,284
Term of patent 14 years
U.S. Cl. D13—160



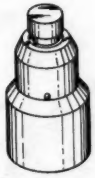
313,972
ELECTRICAL CONTROL UNIT
Dean Hansen, 8437 Golden Ave., Lemon Grove, Calif. 92045
Filed Oct. 19, 1987, Ser. No. 109,703
Term of patent 14 years
U.S. Cl. D13—164



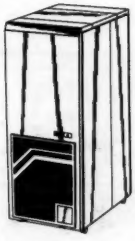
313,973
HAND-HELD CONTROL UNIT FOR THE OPERATION OF AN INFLATABLE AIR MATTRESS
Robert A. Walker, 11010 89th Ave. North, Maple Grove, Minn. 55369
Filed Dec. 30, 1988, Ser. No. 291,987
Term of patent 14 years
U.S. Cl. D13—168



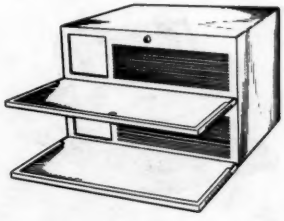
313,974
ELECTRONIC CONDUCTIVE CONTACT SENSOR
Moshe Meller, 20 Rachel Street, Haifa, Israel 33402
Filed Jul. 11, 1989, Ser. No. 378,576
Term of patent 14 years
U.S. Cl. D13—173



313,975
BACKUP MEMORY STORAGE UNIT FOR ELECTRONIC COMPUTER
Hideyuki Horie, Kamagaya, Japan, assignor to Kabushiki Kaisha Toshiba, Kanagawa, Japan
Filed Nov. 17, 1989, Ser. No. 437,924
Claims priority, application Japan, May 19, 1989, 1-18069
Term of patent 14 years
U.S. Cl. D14—100



313,976
DESKTOP-COMPUTER HOUSING OR SIMILAR ARTICLE
Dale C. Bina, Wheaton, Ill., assignor to AT&T Bell Laboratories, Murray Hill, N.J.
Division of Ser. No. 92,114, Sep. 2, 1987, Pat. No. Des. 308,965.
This application Feb. 12, 1990, Ser. No. 478,885
Term of patent 14 years
U.S. Cl. D14—102



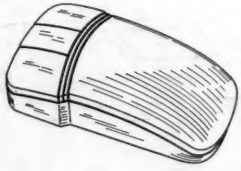
313,977
ELECTRONIC COMPUTER
Masaaki Iino, Yokohama, Japan, assignor to Kabushiki Kaisha Toshiba, Kanagawa, Japan
Filed Nov. 23, 1988, Ser. No. 276,438
Claims priority, application Japan, May 24, 1988, 63-20165
Term of patent 14 years
U.S. Cl. D14—106

313,978
LAPTOP PERSONAL COMPUTER OR THE LIKE
Nobukatsu Miyakuni, Fuchu, Japan, assignor to AI Electronics Corporation, Tokyo, Japan
Filed Nov. 30, 1988, Ser. No. 278,412
Term of patent 14 years
U.S. Cl. D14—106

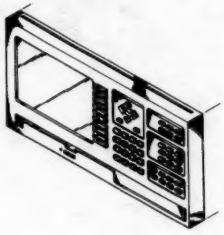
313,979
LAPTOP PERSONAL COMPUTER OR THE LIKE
Nobukatsu Miyakuni, Fuchu, Japan, assignor to AI Electronics Corporation, Tokyo, Japan
Filed Nov. 30, 1988, Ser. No. 278,413
Term of patent 14 years
U.S. Cl. D14—106

313,980
CENTRAL PROCESSOR FOR AN ELECTRONIC COMPUTER
Minoru Ikeda; Miyuki Yamaguti, both of Koganei; Syouji Umemoto, Kodaira; Koushiro Adachi, Tokorozawa; Shiro Fujimori, Koganei; Hiroshi Ui, Narashino; Toshio Mori, Hatano, and Tamotsu Tsukaguchi, Hiratsuka, all of Japan, assignors to Hitachi, Ltd., Tokyo, Japan
Filed Nov. 2, 1989, Ser. No. 430,245
Claims priority, application Japan, May 17, 1989, 1-17649
Term of patent 14 years
U.S. Cl. D14—109

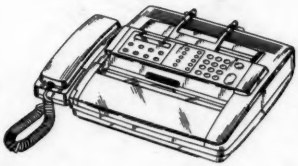
313,981
MOUSE
Eric Yang, Taipei, Taiwan, assignor to Acer Incorporated, Taipei, Taiwan
Filed Jan. 18, 1989, Ser. No. 298,497
Term of patent 14 years
U.S. Cl. D14—114



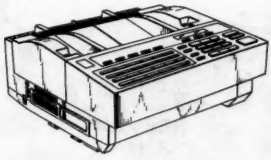
313,982
FRONT PANEL FOR A COMPUTER HOUSING
Randall N. Eilert, and Wilbur R. Ames, IV, both of Lake Stevens, Wash., assignors to Hewlett-Packard Company, Palo Alto, Calif.
Filed Apr. 28, 1989, Ser. No. 344,946
Term of patent 14 years
U.S. Cl. D14—115



313,983
FACSIMILE
Kunio Hara, Chiba, Japan, assignor to Kabushiki Kaisha Toshiba, Kawasaki, Japan
Filed Jan. 28, 1988, Ser. No. 149,693
Claims priority, application Japan, Jul. 31, 1987, 62-30905
Term of patent 14 years
U.S. Cl. D14—118

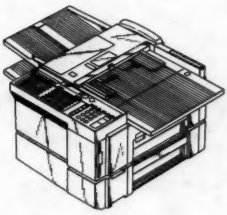


313,984
FACSIMILE TRANSMITTER/RECEIVER
Hiroaki Watanabe, Kawasaki, Japan, assignor to Ricoh Company, Ltd., Tokyo, Japan
Filed Feb. 24, 1989, Ser. No. 314,833
Claims priority, application Japan, Aug. 26, 1988, 63-33892
Term of patent 14 years
U.S. Cl. D14—118



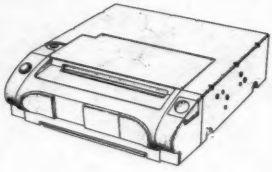
313,985
FACSIMILE TRANSCEIVER
Kunio Hara, Chiba, Japan, assignor to Kabushiki Kaisha Toshiba, Kawasaki, Japan
Filed Apr. 11, 1989, Ser. No. 336,308
Claims priority, application Japan, Oct. 19, 1988, 63-40653
Term of patent 14 years
U.S. Cl. D14—118

313,986
FACSIMILE TRANSMITTER/RECEIVER
Nobuki Matsumoto, Miura, Japan, assignor to Ricoh Company, Tokyo, Japan
Filed Mar. 16, 1989, Ser. No. 324,593
Claims priority, application Japan, Sep. 20, 1988, 63-036891
Term of patent 14 years
U.S. Cl. D14—118

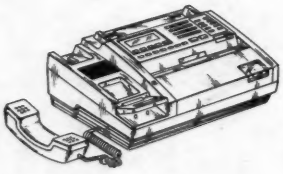


313,987
FACSIMILE TRANSCEIVER
Kunio Hara, Chiba, Japan, assignor to Kabushiki Kaisha Toshiba, Kawasaki, Japan
Filed Apr. 11, 1989, Ser. No. 336,307
Claims priority, application Japan, Oct. 19, 1988, 63-40652
Term of patent 14 years
U.S. Cl. D14—118

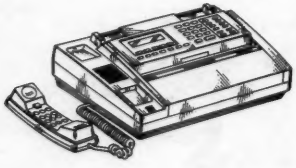
313,988
FACSIMILE TRANSMITTER/RECEIVER
Hiroaki Watanabe, Kawasaki, Japan, assignor to Ricoh Company, Ltd., Tokyo, Japan
Filed Jun. 28, 1989, Ser. No. 373,771
Claims priority, application Japan, Dec. 28, 1988, 51142/88
Term of patent 14 years
U.S. Cl. D14—118



313,989
FACSIMILE TRANSCEIVER
Shin-ichi Hiroki, Tokyo, and Kunio Hara, Chiba, both of Japan, assignors to Kabushiki Kaisha Toshiba, Kawasaki, Japan
Filed Jul. 6, 1989, Ser. No. 375,852
Claims priority, application Japan, Jan. 6, 1989, 39/89
Term of patent 14 years
U.S. Cl. D14—118

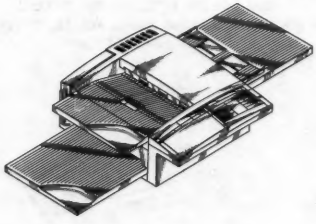


313,990
FACSIMILE TRANSCEIVER
Shin-ichi Hiroki, Tokyo, Japan, assignor to Kabushiki Kaisha Toshiba, Kawasaki, Japan
Filed Jul. 24, 1989, Ser. No. 383,579
Claims priority, application Japan, Feb. 27, 1989, 6625/89
Term of patent 14 years
U.S. Cl. D14—118

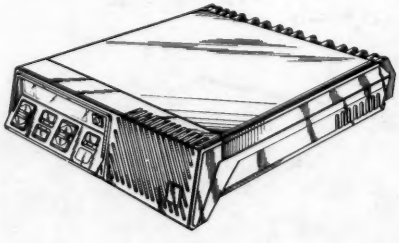


313,991
FACSIMILE TRANSCEIVER
Kunio Hara, Ichihara, and Shin-ichi Hiroki, Tokyo, all of Japan, assignors to Kabushiki Kaisha Toshiba, Kawasaki, Japan
Filed Oct. 4, 1989, Ser. No. 416,940
Claims priority, application Japan, Apr. 7, 1989, 12638/89
Term of patent 14 years
U.S. Cl. D14—118

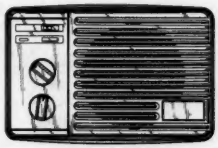
313,992
FACSIMILE TRANSCEIVER
Yasutaka Suge, Tokyo, Japan, assignor to Nippon Steel Corporation, Tokyo, Japan
Filed Dec. 27, 1989, Ser. No. 457,956
Claims priority, application Japan, Jul. 18, 1989, 1-26507
Term of patent 14 years
U.S. Cl. D14—118

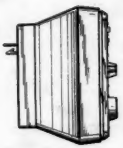


313,993
TWO-WAY MOBILE RADIO
Douglas M. Dickson, Lynchburg, Va., assignor to General Electric Company, Lynchburg, Va. and General Electric Company, Lynchburg, Va.
Filed Apr. 19, 1988, Ser. No. 183,162
Term of patent 14 years
U.S. Cl. D14—137



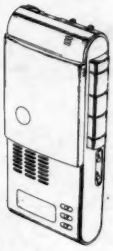
313,994
CONTROL HEAD FOR A RADIO
Richard Culbertson, Lynchburg, Va., assignor to General Electric Company, Lynchburg, Va.
Filed Apr. 19, 1988, Ser. No. 183,169
Term of patent 14 years
U.S. Cl. D14—137



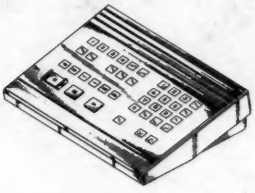


313,995
TELEPHONE SET
Juan M. Azpeitia Ortiz de Arri, San Sebastian Guipuzcoa, Spain, assignor to Solac Telecom, S.A., Vitoria, Spain
Filed Jul. 11, 1989, Ser. No. 378,395
Claims priority, application Spain, Jan. 11, 1989, 117836
Term of patent 14 years
U.S. Cl. D14—151

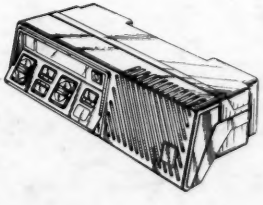
313,996
TAPE RECORDER
Akinori Mitsuse, Hachioji, Japan, assignor to Olympus Optical Co., Ltd., Japan
Filed Oct. 17, 1988, Ser. No. 258,432
Claims priority, application Japan, Apr. 18, 1988, 63-15715
Term of patent 14 years
U.S. Cl. D14—165



313,997
REMOTE CONTROLLER FOR AUDIO MACHINES
Masafumi Ito, Tokyo; Shigeru Hasegawa, Kodaira; Haruki Takita, and Minoru Sube, both of Hachioji, all of Japan, assignors to Teac Corporation, Tokyo, Japan
Filed Feb. 25, 1988, Ser. No. 160,084
Claims priority, application Japan, Aug. 28, 1987, 62-35093
Term of patent 14 years
U.S. Cl. D14—218

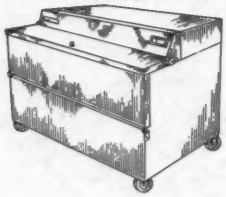


313,998
CONTROL HEAD FOR A RADIO
Douglas M. Dickson, Lynchburg, Va., assignor to General Electric Company, Lynchburg, Va.
Filed Apr. 19, 1988, Ser. No. 183,168
Term of patent 14 years
U.S. Cl. D14—257

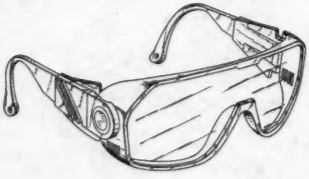


313,999
DRIVING RAM ADAPTER BLOCK
Gerald G. Conti, 62 Henshaw Ave., Springfield, N.J. 07081
Filed May 25, 1988, Ser. No. 198,911
Term of patent 14 years
U.S. Cl. D15—21

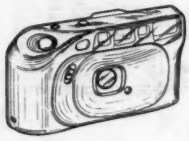
314,000
REFRIGERATED CABINET
Robert A. Johnson, Spartanburg, and Phillip A. Smith, Pauline, both of S.C., assignors to Specialty Equipment Companies, Inc., Berkeley, Ill.
Filed Sep. 30, 1988, Ser. No. 252,907
Term of patent 14 years
U.S. Cl. D15—83



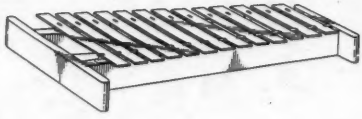
314,001
SAFETY GOGGLE
Herbert Nussbickl, Oberasbach, Fed. Rep. of Germany, assignor to Uvex Winter Optik GmbH, Furth/Bay, Fed. Rep. of Germany
Filed Oct. 1, 1987, Ser. No. 104,113
Claims priority, application World Int. Prop. O., Apr. 22, 1987, DM/008528
Term of patent 14 years
U.S. Cl. D16—102



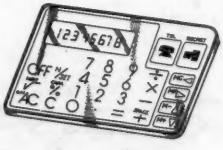
314,002
CAMERA
Michio Yoshida, Tokyo, Japan, assignor to Canon Kabushiki Kaisha, Tokyo, Japan
Filed Sep. 26, 1988, Ser. No. 249,085
Claims priority, application Japan, Mar. 28, 1988, 63-12606
Term of patent 14 years
U.S. Cl. D16—209



314,003
GLOCKENSPIEL
John Dean, 28 Essendon Road, Sanderstead, Surrey CR2 OBU, England
Filed Mar. 10, 1988, Ser. No. 166,603
Term of patent 14 years
U.S. Cl. D17—23



314,004
ELECTRONIC CALCULATOR
Yukihiko Ida, Higashi-Kurume, Japan, assignor to Casio Computer Co., Ltd., Tokyo, Japan
Filed Apr. 20, 1987, Ser. No. 40,584
Term of patent 14 years
U.S. Cl. D18—7



314,005

INK RIBBON CASSETTE

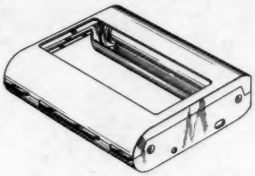
Seiji Okunomiya; Yoichi Narui, both of Katsuta; Katsuya Sato, Mito; Masahi Yoshida, Nakaminato; Kohichi Tomatsuri, Katsuta; Naohiro Ozawa; Hiroshi Shimizu, both of Yokohama; Toshihiko Goth, Tokyo, and Kentaro Hanma, Yokohama, all of Japan, assignors to Hitachi, Ltd., Tokyo, Japan

Filed Nov. 30, 1988, Ser. No. 277,951

Claims priority, application Japan, Jun. 10, 1988, 63-22779

Term of patent 14 years

U.S. Cl. D18—12



314,006

PRINTING HEAD FOR INK JET PRINTER

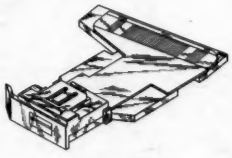
Tsutomu Abe, Isehara, and Kenjiro Watanabe, Tokyo, both of Japan, assignors to Canon Kabushiki Kaisha, Tokyo, Japan

Filed Jul. 12, 1988, Ser. No. 218,022

Claims priority, application Japan, Jan. 13, 1988, 63-888

Term of patent 14 years

U.S. Cl. D18—22



314,007

PRINTING HEAD FOR A PRINTER OF A COMPUTER

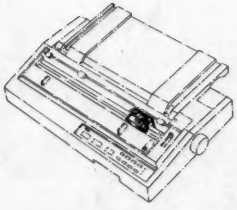
Koichi Kimura; Takeshi Matsumoto, and Fumio Ohtsuka, all of Tokyo, Japan, assignors to Seikosha Co., Ltd., Tokyo, Japan

Filed Feb. 16, 1989, Ser. No. 311,680

Claims priority, application Japan, Sep. 2, 1988, 63-34796

Term of patent 14 years

U.S. Cl. D18—22



314,008

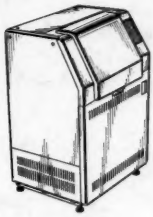
IMAGE RECORDER FOR PRINTING

Mikio Takahashi, and Masahiro Fukuda, both of Tokyo, Japan, assignors to Fuji Photo Film Co., Ltd., Kanagawa, Japan

Filed Apr. 19, 1988, Ser. No. 186,089

Term of patent 14 years

U.S. Cl. D18—36



314,009

FOLDER FOR A GUIDED MENU, OR THE LIKE

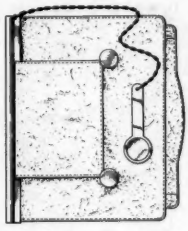
Maria Boitani, Via Bissolati, No. 54, Rome 00187, Italy

Filed Apr. 21, 1987, Ser. No. 41,740

Claims priority, application Italy, Oct. 31, 1986, 36220/86[U]

Term of patent 14 years

U.S. Cl. D19—26



314,010

BOOK

Lucy Körner, Bahnhofstrasse 49, D-7012 Fellbach, Fed. Rep. of Germany

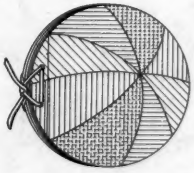
Filed Sep. 9, 1988, Ser. No. 243,018

Claims priority, application Fed. Rep. of Germany, Mar. 10, 1988, 1151

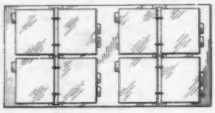
The portion of the term of this patent subsequent to Oct. 10, 2003, has been disclaimed.

Term of patent 14 years

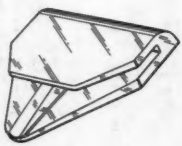
U.S. Cl. D19—26



314,011
RECIPE ALBUM
Martha Stahl, 6695 Heron Ct., Orient, Ohio 43146
Filed Sep. 26, 1988, Ser. No. 249,098
Term of patent 14 years
U.S. Cl. D19—27

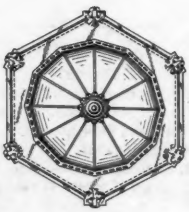


314,012
PAPER FASTENER
Gerald J. Klodt, Madison, Wis., assignor to W. T. Rogers Company, Madison, Wis.
Filed Sep. 28, 1987, Ser. No. 101,753
Term of patent 14 years
U.S. Cl. D19—65

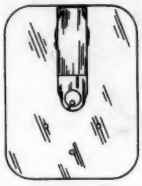


314,013
CARDHOLDER
Jeffrey Rowe, Parker, Colo., assignor to Comtech Services, Inc., Denver, Colo.
Filed Feb. 10, 1988, Ser. No. 154,629
Term of patent 14 years
U.S. Cl. D19—76

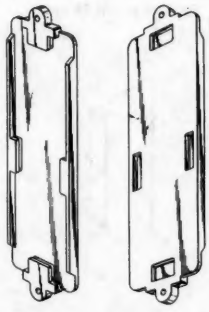
314,014
ADVERTISING COLUMN AND THE LIKE
Jean-Claude Decaux, Neuilly sur Seine, France, assignor to J. C. Decaux, Neuilly sur Seine, France
Filed Sep. 2, 1988, Ser. No. 240,226
Claims priority, application France, Mar. 2, 1988, 88 1417
Term of patent 14 years
U.S. Cl. D20—10



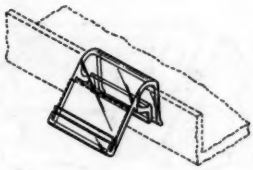
314,015
CLIP-ON NAME TAG HOLDER
Anthony E. Hickman, Sr., 1706 E. Crockett St., San Antonio, Tex. 78202
Filed May 25, 1988, Ser. No. 198,374
Term of patent 14 years
U.S. Cl. D20—27



314,016
CARD HOLDER
David S. Mitchell, South Glamorgan, England, assignor to Scafftag Limited, South Glamorgan, England
Filed Jul. 27, 1988, Ser. No. 224,701
Claims priority, application United Kingdom, Jan. 29, 1988, 1048136
Term of patent 14 years
U.S. Cl. D20—43



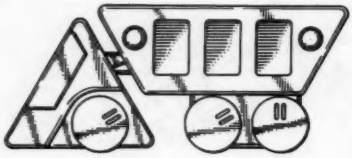
314,017
LABEL HOLDER
Benjamin L. Garfinkle, Alameda, Calif., assignor to Clamp Swing Pricing Co., Inc., Alameda, Calif.
Filed Feb. 3, 1989, Ser. No. 306,456
Term of patent 14 years
U.S. Cl. D20—43



314,018
GAME DIE
Martin Rosenthal, Feilitzschstr. 34, 8000 Munchen 40, Fed. Rep. of Germany
Filed Sep. 14, 1988, Ser. No. 244,390
Claims priority, application Fed. Rep. of Germany, Mar. 17, 1988, 17758
Term of patent 14 years
U.S. Cl. D21—41

314,019
ELEPHANT SPRAY BOP BAG
Gordon Young, 1728 Rosemeade Cir., Carrollton, Tex. 75007
Filed Nov. 21, 1988, Ser. No. 274,035
Term of patent 14 years
U.S. Cl. D21—69

314,020
TOY BLOCK VEHICLE
Hideki Tachikawa, Tokyo, Japan, assignor to Tomy Company, Ltd., Tokyo, Japan
Filed Jun. 2, 1989, Ser. No. 360,736
Claims priority, application Japan, Dec. 9, 1988, 63-48078
Term of patent 14 years
U.S. Cl. D21—134

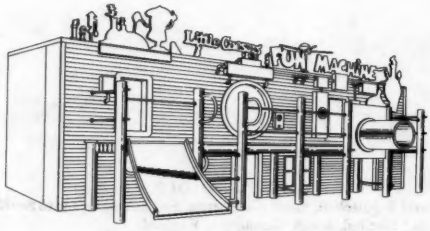


314,021
GRAVITY LOAD MAGAZINE FOR PAINT PELLET PISTOL
Paul N. Kuljis, 3604 S. Cabrillo Ave., San Pedro, Calif. 90731
Filed Dec. 18, 1987, Ser. No. 134,912
Term of patent 14 years
U.S. Cl. D21—145

314,022
STUFFED TOY FIGURE
C. Garland Robinette, Folsom, La., assignor to Louisiana Children's Museum, New Orleans, La.
Filed Feb. 22, 1988, Ser. No. 158,997
Term of patent 14 years
U.S. Cl. D21—148

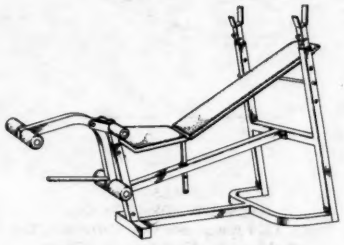
314,023
DOLL
Victoria McCharen, 699 Helen Dr., Hollister, Calif. 95023
Filed Dec. 14, 1987, Ser. No. 132,141
Term of patent 14 years
U.S. Cl. D21—171

314,024
MULTI-LEVEL GYM
Anthony J. Micale, Livonia, Mich., assignor to Little Caesar Enterprises, Farmington Hills, Mich.
Filed Jul. 31, 1987, Ser. No. 80,053
Term of patent 14 years
U.S. Cl. D21—191

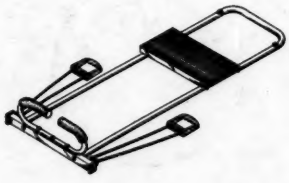


314,025
PHYSICAL EXERCISER
Edward B. Shimer, 86 Kurtz Rd., Schwenksville, Pa. 19473
Filed May 20, 1988, Ser. No. 196,637
Term of patent 14 years
U.S. Cl. D21—191

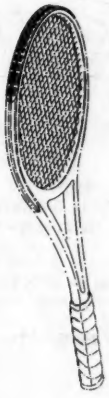
314,026
EXERCISE BENCH
Homer F. Jennings, Olney, Ill., assignor to Weider Health & Fitness, Woodland Hills, Calif.
Filed May 20, 1988, Ser. No. 196,963
Term of patent 14 years
U.S. Cl. D21—191



314,027
PHYSICAL EXERCISER
Yuan-Hung Lo, No. 8-1, Tou Chien St., Kan Kau Tsun, Lu Chu Hsiang, Tao-Yuan Hsien, Taiwan
Filed Aug. 3, 1988, Ser. No. 228,667
Term of patent 14 years
U.S. Cl. D21—195

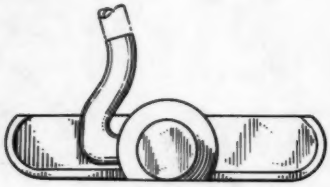


314,028
BUMPER STRIP FOR TENNIS RACQUETS
Stephen J. Davis, New Hope, Pa., assignor to Prince Manufacturing, Inc., Lawrenceville, N.J.
Filed Jun. 27, 1988, Ser. No. 211,663
Term of patent 14 years
U.S. Cl. D21—212



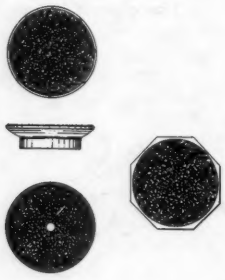
314,029
GOLF CLUB HEAD
Dillis V. Allen, 240 Lincolnshire Ct., Schaumburg, Ill. 60193
Filed Aug. 17, 1988, Ser. No. 232,885
Term of patent 14 years
U.S. Cl. D21—214

314,030
GOLF CLUB HEAD
Robert P. Sanchez, 934 W. Willow, Chicago, Ill. 60614
Filed Mar. 17, 1988, Ser. No. 169,363
Term of patent 14 years
U.S. Cl. D21—217



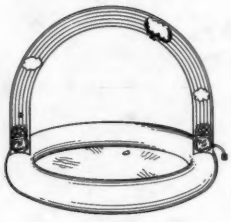
314,031
GOLF CLUB HEAD
Kanji Iinuma, Musashino, Japan, assignor to David Golf Co., Ltd., Tokyo, Japan
Division of Ser. No. 11,218, Feb. 5, 1987, Pat. No. D. 310,115.
This application Mar. 22, 1990, Ser. No. 497,244
Claims priority, application Japan, Aug. 7, 1986, 61-30912; Aug. 7, 1986, 61-30913
Term of patent 14 years
U.S. Cl. D21—217

314,032
BOWLING BALL ABRADING DEVICE
Michael G. Gordon, 4997 Chadbourne, Sterling Heights, Mich. 48310
Filed May 1, 1987, Ser. No. 45,667
Term of patent 14 years
U.S. Cl. D21—233



314,033
SURFING BOAT
Herry Chang, No. 371-7, Hsin Ming Road, Nei Hu District, Taipei, Taiwan
Filed Mar. 28, 1988, Ser. No. 179,892
Term of patent 14 years
U.S. Cl. D21—236

314,034
RAINBOW SPRAY POOL
Gordon Young, 1728 Rosemeade Cir., Carrollton, Tex. 75007
Filed Nov. 21, 1988, Ser. No. 273,491
Term of patent 14 years
U.S. Cl. D21—252



314,035
COMBINED SPRAY AND PLAY POOL
Gordon Young, 1728 Rosemeade Cir., Carrollton, Tex. 75007
Filed Nov. 21, 1988, Ser. No. 273,492
Term of patent 14 years
U.S. Cl. D21—252

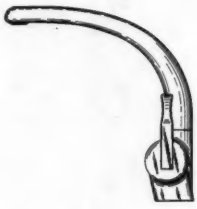
314,036
REEL SEAT FOR FISHING ROD
Mitsuyoshi Oyama, Musashino, assignor to Daiwa Seiko, Inc., Tokyo, Japan
Filed Sep. 29, 1988, Ser. No. 250,820
Claims priority, application Japan, Apr. 6, 1988, 63-13893
Term of patent 14 years
U.S. Cl. D22—142

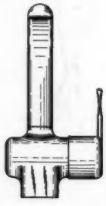
314,037
LUMINOUS BOBBER
Hubert G. Lovelady, and Douglas P. Hopkins, both of 4702 Lavender La., San Antonio, Tex. 78220
Filed Mar. 11, 1988, Ser. No. 178,686
Term of patent 14 years
U.S. Cl. D22—146

314,038
SHOWER MULTI-LIQUID DISPENSER
Duard I. Hardy, 14105 Knottingsley Pl., Tampa, Fla. 33624
Filed Apr. 22, 1988, Ser. No. 184,712
Term of patent 14 years
U.S. Cl. D23—228

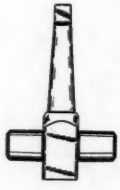
314,039
HAND PUMP FOR BAILING LIQUIDS
Darrell L. Manchester, and Randall T. Smith, both of San Diego, Calif., assignors to Darrell L. Manchester, Satellite Beach, Fla.
Filed May 18, 1987, Ser. No. 51,126
Term of patent 14 years
U.S. Cl. D23—231

314,040
FAUCET
Wolfgang Heleck, Langenau, Fed. Rep. of Germany, assignor to Knebel & Rottger GmbH & Co., Iserlohn, Fed. Rep. of Germany
Filed Jun. 11, 1987, Ser. No. 62,044
Claims priority, application Fed. Rep. of Germany, Dec. 12, 1986, MR7520
Term of patent 14 years
U.S. Cl. D23—238





314,041
FAUCET
Alfons Knapp, Bleicherstrasse 3, Biberach/Riss, Fed. Rep. of Germany
Filed Jun. 2, 1987, Ser. No. 57,436
Claims priority, application Italy, Dec. 11, 1986, 54185/86[U]
Term of patent 14 years
U.S. Cl. D23—241



314,042

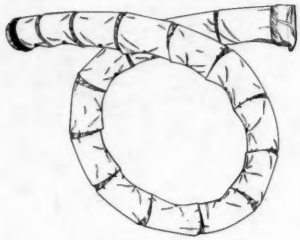
INSULATING REMOVABLE CABLE JACKET

Lennart Berg, Frösön, Sweden, assignor to Polarn Innovation Aktiebolag, Ostersund, Sweden

Filed Sep. 10, 1987, Ser. No. 94,814

Term of patent 14 years

U.S. Cl. D23—266



314,043

ELASTIC TOILET LID COVER

Sidney J. Beller, and Marion M. Beller, both of 20500 Miranda Pl., Woodland Hills, Calif. 91367

Filed Mar. 30, 1987, Ser. No. 32,200

Term of patent 14 years

U.S. Cl. D23—311

314,044

ELECTRIC HOT PLATE FOR HEATING DEODORANT TABLETS FOR INSERTION IN THE ELECTRIC LIGHTER OUTLET OF A MOTORVEHICLE OR THE LIKE

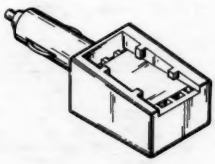
Antonio Montanari, Bresso, Italy, assignor to Servizi Autostradali S.r.l., Italy

Filed Jun. 17, 1988, Ser. No. 208,024

Claims priority, application Italy, Dec. 18, 1987, 22911/87[U]

Term of patent 14 years

U.S. Cl. D23—366



314,045

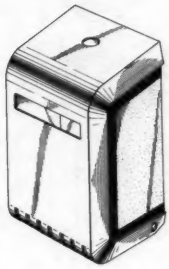
AIR FRESHENER DISPENSER CASING

Raymond F. DeLuca, Stamford, Conn., and Eric S. Seger, Wantagh, N.Y., assignors to Georgia-Pacific Corporation, Atlanta, Ga.

Filed Jul. 27, 1989, Ser. No. 385,476

Term of patent 14 years

U.S. Cl. D23—366



314,046

CEILING FAN

Fong S. Yen, Floor 7, Alley No. 147, Ta An Road, Section 1, Taipei, Taiwan

Filed Nov. 9, 1989, Ser. No. 432,398

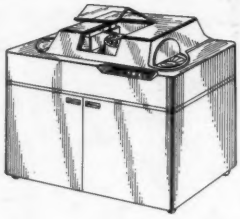
Term of patent 14 years

U.S. Cl. D23—377

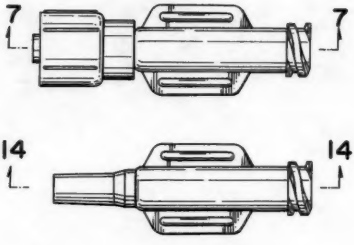
314,047
PORTABLE ELECTRICAL FAN
Jui-Shang Wang, Taipei, Taiwan, assignor to Duracraft Corporation, Sudbury, Mass.
Filed Aug. 9, 1989, Ser. No. 391,326
Term of patent 14 years
U.S. Cl. D23—378

314,048
PORTABLE, HEIGHT ADJUSTABLE BATTERY-POWERED FAN
Raymond Leon, Jr., 51935 Sunset Dr., Coachella, Calif. 92236
Filed Sep. 25, 1989, Ser. No. 411,621
Term of patent 14 years
U.S. Cl. D23—378

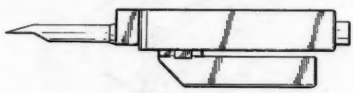
314,049
BIOCHEMICAL ANALYZER
Masaharu Katayama, Tokyo, Japan, assignor to Kabushiki Kaisha Toshiba, Kawasaki, Japan
Filed Sep. 8, 1987, Ser. No. 94,432
Claims priority, application Japan, Mar. 25, 1987, 62-10841
Term of patent 14 years
U.S. Cl. D24—1.1



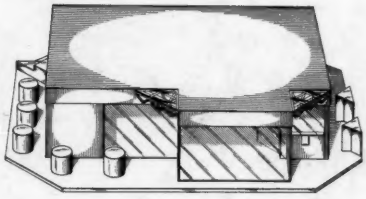
314,050
MEDICAL CONNECTOR
Yoshihisa Sone, Tokyo, Japan, assignor to Terumo Kabushiki Kaisha, Tokyo, Japan
Filed May 27, 1988, Ser. No. 200,177
Claims priority, application Japan, Nov. 27, 1987, 62-48265; Nov. 27, 1987, 62-48266
Term of patent 14 years
U.S. Cl. D24—53



314,051
DRUG RELEASE VALVE FOR A PARENTERAL ADMINISTRATION SYSTEM
Bengt G. Berglund, Göteborg; Nils B. Nilson, Mjölby, and Ake S. Nilsson, Göteborg, all of Sweden, assignors to Aktiebolaget Hassle, Molndal, Sweden
Filed Jan. 7, 1987, Ser. No. 1,105
Claims priority, application Sweden, Jul. 10, 1986, 861656
Term of patent 14 years
U.S. Cl. D24—53

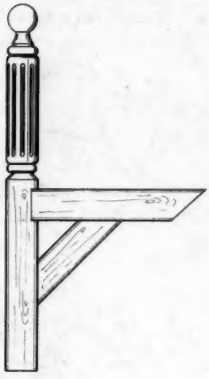


314,052
CONVENIENCE STORE
Raymond Poelvoorde, New York, N.Y., assignor to Sun Refining and Marketing Company, Philadelphia, Pa.
Filed Dec. 16, 1988, Ser. No. 285,887
Term of patent 14 years
U.S. Cl. D25—33



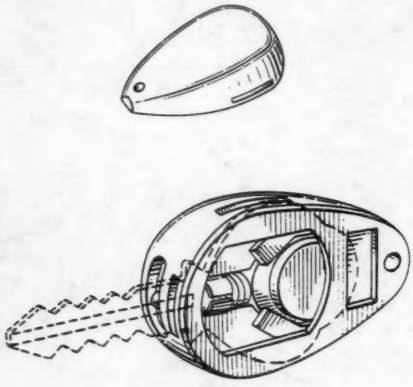
314,053
POST
Milton E. Handler, Northbrook, and Herbert Baisch, Palatine, both of Ill., assignors to Hirsh Company, Skokie, Ill.
Filed Apr. 17, 1989, Ser. No. 339,356
Term of patent 14 years
U.S. Cl. D25—43

314,054
MAILBOX POST
John F. Meyer, 1205 Lafayette Dr., New Albany, Ind. 47150
Filed Jun. 12, 1989, Ser. No. 364,214
Term of patent 14 years
U.S. Cl. D25—126



314,055
COMBINED FIBER OPTIC LAMP AND MUSIC BOX
Robert M. Ross, Jr., Garland, and Robert J. McNally, Richardson, both of Tex., assignors to Great Western Trading Co., Inc., Plano, Tex.
Filed Jun. 28, 1989, Ser. No. 372,951
Term of patent 14 years
U.S. Cl. D26—27

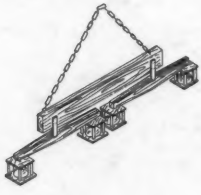
314,056
KEY-MOUNTED FLASHLIGHT
Chung-Fai Law, 3 Kin Kwan Street, Winfield Industrial Building, 4th Floor, Block H, Twen Mun, New Territories, Hong Kong
Filed Oct. 21, 1988, Ser. No. 260,667
Claims priority, application United Kingdom, Apr. 27, 1988, 1050333
Term of patent 14 years
U.S. Cl. D26—38



314,057
TORCH
Francesco Naldi, Venegono Superiore, Italy, assignor to Velamp S.p.A., Venegono Superiore, Italy
Filed Jun. 21, 1988, Ser. No. 209,354
Claims priority, application Italy, Dec. 22, 1987, 22934/87[U]
Term of patent 14 years
U.S. Cl. D26—49

314,058
ADJUSTABLE LAMP
Pony Yuan, No. 1-2, Alley 32, Lane 31, Shuang Ho Street, Taipei, Taiwan
Filed Aug. 24, 1988, Ser. No. 235,502
Term of patent 14 years
U.S. Cl. D26—63

314,059
HANGING LIGHTING FIXTURE
Robert L. O'Neil, 400 North "A" St., Richmond, Ind. 47374
Filed Feb. 13, 1985, Ser. No. 701,346
Term of patent 14 years
U.S. Cl. D26—73



314,060
CEILING LIGHT
Ernesto Gismondi, Milan, Italy, assignor to Artemide S.p.A., Italy
Filed Jul. 7, 1989, Ser. No. 376,538
Claims priority, application Italy, Jan. 10, 1989, 52807/89[U]
Term of patent 14 years
U.S. Cl. D26—90

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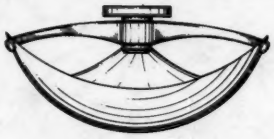
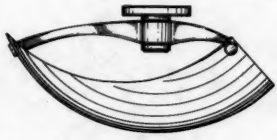




314,061
ASH TRAY
Mei Evenson, San Pedro, Calif., assignor to Eldon Industries, Inc., Inglewood, Calif.
Division of Ser. No. 741,455, Jun. 5, 1985, Pat. No. Des. 302,177. This application Jan. 19, 1989, Ser. No. 299,244
Term of patent 14 years
U.S. Cl. D27—134

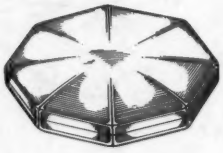
314,062
LIGHTER
Kuo-wen Chen, No. 53 Lane 145, Tung Hwa North Road, Taipei, Taiwan
Filed Mar. 17, 1989, Ser. No. 324,641
Term of patent 14 years
U.S. Cl. D27—152

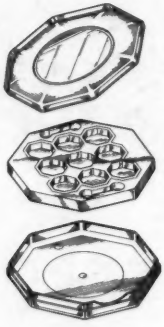
314,063
LIGHTER
Tsutomu Shike, and Isao Inoue, both of Kanagawa, Japan, assignors to Tokai Corporation, Yokohoma, Japan
Filed Apr. 2, 1990, Ser. No. 503,563
Claims priority, application Japan, Nov. 10, 1989, 1-40825
Term of patent 14 years
U.S. Cl. D27—154

314,064
HAIR CURLING BRUSH OR SIMILAR ARTICLE
Elizabeth Ho, Kowloon, Hong Kong, assignor to Windmere Corporation, Miami Lakes, Fla.
Filed Oct. 12, 1988, Ser. No. 257,033
Claims priority, application United Kingdom, Jun. 7, 1988, 1051334
Term of patent 14 years
U.S. Cl. D28—35

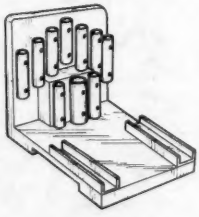
314,065
HAIR DRYER
Yuji Kakuya, Osaka, Japan, assignor to Takara Belmont Kabushiki Kaisha, Osaka, Japan
Filed Jan. 24, 1989, Ser. No. 301,250
Claims priority, application Japan, Sep. 17, 1988, 63-36638
Term of patent 14 years
U.S. Cl. D28—17

314,066
COSMETIC CASE
Karena Bakic, Varese, Italy, assignor to Cosmede Anstalt, Vaduz, Liechtenstein
Division of Ser. No. 128,473, Dec. 3, 1987. This application Oct. 23, 1989, Ser. No. 424,940
Claims priority, application Fed. Rep. of Germany, Jun. 16, 1987, URA838/87
Term of patent 14 years
U.S. Cl. D28—77



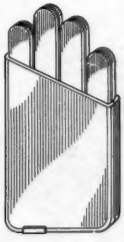


314,067
ORGANIZER FOR HAIR CURLERS
Delores Ward, 19303 Fielding, Detroit, Mich. 48209
Filed Mar. 16, 1989, Ser. No. 324,342
Term of patent 14 years
U.S. Cl. D28—38

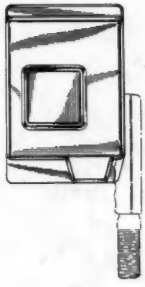


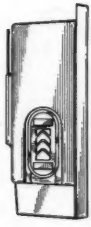
314,068
MANICURING IMPLEMENT
Joseph M. Sulik, Beacon Falls, Conn., assignor to Remington Products, Inc., Bridgeport, Conn.
Filed Jul. 31, 1989, Ser. No. 387,888
Term of patent 14 years
U.S. Cl. D28—58

314,069
MANICURE TOOL HOLDER AND TOOLS
Andrew L. Alger, 230 Maple Ave., and Paul B. Specht, 241 Laurel, both of Wilmette, Ill. 60091
Filed Jan. 25, 1989, Ser. No. 301,740
Term of patent 14 years
U.S. Cl. D28—61

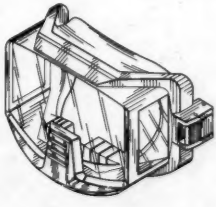


314,070
WALL-MOUNTED GARMENT DRYER
Richard H. Rubin, Cape Town, South Africa, assignor to Richard H. Rubin Trust Panache World (Pty) Ltd., Hout Bay, South Africa
Continuation-in-part of Ser. No. 700,658, Feb. 11, 1985, Pat. No. D. 292,237. This application Oct. 5, 1987, Ser. No. 105,683
Claims priority, application South Africa, Aug. 13, 1984, 84/0762
Term of patent 14 years
U.S. Cl. D28—54.1



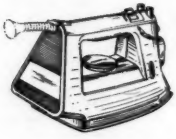


314,071
DIVE MASK
Robert L. Applegate, Long Beach, Calif., assignor to Under Sea Industries, Inc., Rancho Dominguez, Calif.
Filed Jan. 25, 1988, Ser. No. 148,398
Term of patent 14 years
U.S. Cl. D29—9

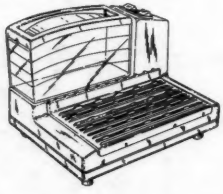


314,072
ELECTRIC VACUUM CLEANER
Isamu Shinozaki, and Kunio Funatsu, both of Osaka, Japan, assignors to Matsushita Electric Industrial Co., Ltd., Osaka, Japan
Filed Apr. 23, 1990, Ser. No. 513,514
Claims priority, application Japan, Nov. 29, 1989, 1-43455
Term of patent 14 years
U.S. Cl. D32—22

314,073
STEAM IRON
Franz A. Stiltzer, Offenbach am Main, and Eduard Rohner, Karlstein, both of Fed. Rep. of Germany, assignors to Rowenta-Werke GmbH, Offenbach am Main, Fed. Rep. of Germany
Filed Jan. 23, 1989, Ser. No. 301,253
Claims priority, application Fed. Rep. of Germany, Jul. 25, 1988, M8800552
Term of patent 14 years
U.S. Cl. D32—70



314,074
COMBINED ELECTRIC IRON SUPPORT AND STEAM GENERATOR
Jean-Louis Barrault, Boulogne-Billancourt, France, assignor to Moulinex S.A., Bagnolet, France
Filed Jul. 12, 1989, Ser. No. 380,714
Claims priority, application France, Jan. 12, 1989, 89 0230
Term of patent 14 years
U.S. Cl. D32—73

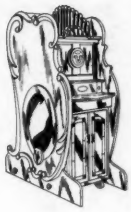


314,075

BALLOON INFLATING AND DISPENSING CART

Patricia J. Hollerback, P.O. Box 8531, Breckenridge, Colo. 80424, and Christopher J. Hollerback, No. 8, Broomfield, Colo. 80020

Filed Jan. 19, 1988, Ser. No. 145,482
Term of patent 14 years
U.S. Cl. D34—13

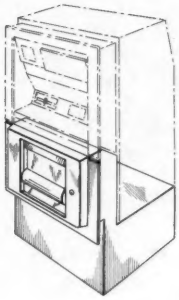


314,076

NIGHT DEPOSITORY FOR USE WITH AUTOMATED TELLER MACHINE OR SIMILAR ARTICLE

Alex M. Tarkany, 1526 Langdon Dr., Centerville, Ohio 45459; John P. Caldwell, 2918 Asbury Ct., Miamisburg, Ohio 45342, and Jay Sucre, 400 Pamela Sue Dr., Kettering, Ohio 45429

Filed Apr. 1, 1987, Ser. No. 33,541
Term of patent 14 years
U.S. Cl. D99—28



LIST OF PATENTEES

TO WHOM

PATENTS WERE ISSUED ON THE 22ND DAY OF JANUARY, 1991

NOTE.—Arranged in accordance with the first significant character or word of the name (in accordance with city and telephone directory practice).

A. Ahlstrom Corporation: *See*—
Mason, Chauncey, 4,986,900, Cl. 209-397.000.

A.O. Smith Corporation: *See*—
Deisinger, John J., 4,986,468, Cl. 236-21.00R.

A. Stucki Company Division of Hansen Inc.: *See*—
Wiebe, Donald, 4,986,192, Cl. 105-198.400.

AB Tetra Pak: *See*—
Carlsson, Lars C.; and Bruveris, Vilnis, 4,986,058, Cl. 53-563.000.
Watanabe, Masashi, 4,986,859, Cl. 156-69.000.

Abandaco, Inc.: *See*—
Blackburn, William A., 4,985,937, Cl. 2-312.000.

Abe, Kazuo, to Toyota Jidosha kabushiki Kaisha. Purge control device for use in an internal combustion engine. 4,986,070, Cl. 60-285.000.

Abe, Masayoshi: *See*—
Suzuki, Kunio; Fukada, Takeshi; Kinka, Mikio; Abe, Masayoshi; Shibata, Katsuhiko; Susukida, Masato; Ishida, Noriya; Satake, Akemi; and Arai, Yasuyuki, 4,987,005, Cl. 427-39.000.
Yamazaki, Shunpei; Suzuki, Kunio; Nagayama, Susumu; Inujima, Takashi; Abe, Masayoshi; Fukada, Takeshi; Kinka, Mikio; Kobayashi, Ippei; Shibata, Katsuhiko; Susukida, Masato; and Koyanagi, Kaoru, 4,986,213, Cl. 118-719.000.

Abe, Minoru: *See*—
Kajitani, Koji; and Abe, Minoru, 4,986,404, Cl. 192-109.00F.

Abe, Shunichi: *See*—
Ikeda, Yoshinori; Yoshida, Tadashi; Hayashi, Kimiyoshi; Abe, Shunichi; Matsuoka, Nobuo; Akiyama, Mitsuo; and Mita, Yoshinobu, 4,987,484, Cl. 358-75.000.

Abe, Tomomitsu: *See*—
Takahashi, Yutaka; Harashima, Ikuo; Nakayama, Shunichi; Arai, Yasuyuki; Takayanagi, Yasushi; Sekiguchi, Ryoichi; Abe, Tomomitsu; and Hayakawa, Hiroshi, 4,986,448, Cl. 222-129.100.

Abel, Mark J.: *See*—
Stults, Robert A.; Harrison, Steven R.; Merrow, Thomas E.; Laursen, Jane J.; Goodman, George O.; Trow, Jay; and Abel, Mark J., 4,987,492, Cl. 358-181.000.

Abell, Gerald D.: *See*—
Wertz, Thomas J.; Todd, Russell W.; and Abell, Gerald D., 4,986,839, Cl. 55-274.000.

ABG-Werke GmbH: *See*—
Heims, Dirk, 4,986,695, Cl. 404-118.000.

Abkowitz, Stanley; Rowell, David M.; Heussi, Harold L.; Ludwig, Harold P.; and Kraus, Stephen A., to Dynamet Technology, Inc. Impact resistant clad composite armor and method for forming such armor. 4,987,033, Cl. 428-469.000.

Abu-Shumays, Ibrahim K.; and Abu-Shumays, Mary D. Hinge mounted and slidable sun visors. 4,987,315, Cl. 296-97.110.

Abu-Shumays, Mary D.: *See*—
Abu-Shumays, Ibrahim K.; and Abu-Shumays, Mary D., 4,987,315, Cl. 296-97.110.

ABX: *See*—
Champseaux, Serge, 4,986,308, Cl. 137-625.440.

Accurate Products Co.: *See*—
Buehning, Peter G., 4,986,743, Cl. 425-7.000.

Achgill, Ralph K.; and Call, Laurence W., to Eli Lilly and Company. Process for preparing herbicidal ureas and insecticidal carbamates and carbamate derivatives. 4,987,233, Cl. 548-140.000.

Achilles Corporation: *See*—
Tozune, Sigeru; Yamazaki, Shizuo; Komori, Ryuichi; Ishii, Masashi; Sakaguchi, Yoshio; and Oda, Tetsuya, 4,987,156, Cl. 521-99.000.

Achter, Eugen; Duenisch, Ingo; and Lausch, Michael, to Heimann GmbH. Flash lamp with metal coating on an outer end of an electrode thereof. 4,987,341, Cl. 313-623.000.

Ackeret, Peter, to Licinvest AG. Device for the cyclic rearrangement of a pile of rectangular of square sheets. 4,986,015, Cl. 40-511.000.

Ackermann, Francois: *See*—
Berrebi, Georges; and Ackermann, Francois, 4,986,424, Cl. 209-691.000.

Ackermann, Norbert: *See*—
Preukschat, Alfred; and Ackermann, Norbert, 4,986,393, Cl. 188-299.000.

Acustar, Inc.: *See*—
Lawless, Daniel F., 4,986,126, Cl. 73-708.000.

Adachi, Hideo: *See*—
Takase, Tsugiko; Adachi, Hideo; Okada, Takao; Shimazu, Hisanari; and Tomabechi, Hideo, 4,987,303, Cl. 250-306.000.

Adachi, Kazunari, to Alsin Seiki Kabushiki Kaisha. Mechanical supercharger having a thrust bearing. 4,986,740, Cl. 418-83.000.

Adams, Charles N., III; and Morningstar, Leroy J., to AMP Incorporated. Polarization and keying mechanism. 4,986,769, Cl. 439-681.000.

Adams, Earl G.; Bayer, Arthur C.; Farmer, Alan D.; and Hook, Brenda J., to First Chemical Corporation. Selective recovery of a nitrophenolic by-product from nitration waste water by extraction. 4,986,917, Cl. 210-634.000.

Adams, Earl G.; Bayer, Arthur C.; Farmer, Alan D.; and Hook, Brenda J., to First Chemical Corporation. Selective recovery of a nitrophenolic by-product from nitration waste water by precipitation. 4,986,920, Cl. 210-710.000.

Adams Rite Manufacturing Company: *See*—
Logas, Duane K., 4,986,584, Cl. 292-341.160.

Adams, Theodore P.: *See*—
King, Wendell L.; Kane, Lawrence M.; and Adams, Theodore P., 4,986,831, Cl. 623-1.000.

Advanced Interconnections Corporation: *See*—
Murphy, James V., 4,985,989, Cl. 29-829.000.

Advanced Micro Devices, Inc.: *See*—
Akins, Joseph F.; Goddard, Donald G.; Goszewski, Cynthia P.; and Haacke, Ernest D., 4,987,578, Cl. 375-121.000.
Longcor, Steven W.; Chang, Kuang-Yeh; Lien, Jih-Chang; and Rogers, David M., 4,987,465, Cl. 357-23.130.
Scott, Paul H., 4,987,572, Cl. 370-91.000.

Aerometrics, Inc.: *See*—
Bachalo, William D., 4,986,659, Cl. 356-336.000.

Aeros Instruments, Inc.: *See*—
Martin, Gordon D., 4,986,298, Cl. 137-15.000.

Aerospace Corporation, The: *See*—
Sheaffer, Patrick M.; and White, Jack L., 4,986,943, Cl. 264-29.100.

Aesa Aktiebolag: *See*—
Eriksson, Jan E., 4,986,340, Cl. 164-468.000.

Aff, John: *See*—
Boehringer, John R.; and Aff, John, 4,986,175, Cl. 101-125.000.

AG Communication Systems Corporation: *See*—
Belanger, Thomas D., Jr.; and Johnson, Roy L., 4,987,516, Cl. 361-413.000.

Agarwal, Vinod K.; Dixon, Barry M.; Foerster, Joseph C.; and Jones, Gregory G., to Xerox Corporation. Four roll inverter. 4,986,529, Cl. 271-291.000.

Agatsuma, Ko: *See*—
Uchiyama, Futoshi; Agatsuma, Ko; Ohara, Takeshi; Tsukamoto, Koichi; Ishigami, Sumiyuki; Sato, Mitsuru; and Sugimoto, Hisashi, 4,986,670, Cl. 374-117.000.

Ageishi, Kentaro; and Pu, Lyong S., to Fuji Xerox Co., Ltd. Wavelength converting device. 4,986,935, Cl. 252-587.000.

Agency of Industrial Science & Technology: *See*—
Okazaki, Yuichi, 4,986,150, Cl. 82-137.000.

Agency of Industrial Science & Technology, Ministry of International Trade Industry: *See*—
Maeda, Yuji, 4,986,723, Cl. 414-729.000.

Agency of Industrial Science & Technology, Ministry of International Trade & Tokyo Denpa Co., Ltd.: *See*—
Uchiyama, Futoshi; Agatsuma, Ko; Ohara, Takeshi; Tsukamoto, Koichi; Ishigami, Sumiyuki; Sato, Mitsuru; and Sugimoto, Hisashi, 4,986,670, Cl. 374-117.000.

Agfa Gevaert AG: *See*—
Benker, Gerhard; Nitsch, Wilhelm; Payrhammer, Bernd; Weinert, Volker; Treiber, Helmut; and Kluter, Ulrich, 4,987,440, Cl. 355-41.000.

Agfa-Gevaert Aktiengesellschaft: *See*—
Berthold, Werner; Haseler, Helmut; Marx, Paul; Meckl, Heinz; and Ohischlager, Hans, 4,987,059, Cl. 430-428.000.
Spriewald, Erika; Tappe, Gustav; and Meckl, Heinz, 4,987,058, Cl. 430-372.000.

Agfa-Gevaert Aktiengesellschaft: *See*—
Kampfer, Helmut; Patzold, Walter; and Mahlberg, Gunther, 4,987,063, Cl. 430-550.000.

Agfa-Gevaert, N.V.: *See*—
Roosen, Raymond A.; De Meyer, Marcellus H.; and Janssens, Wilhelmus, 4,987,043, Cl. 430-7.000.
Vanmaele, Luc J.; and Janssens, Wilhelmus, 4,987,119, Cl. 503-227.000.

AGIP S.p.A.: *See*—
Lockhart, Thomas P.; and Burrafato, Giovanni, 4,986,356, Cl. 166-300.000.

Agnew, Colvin H.; Wade, Weldon O.; and Agnew, Stuart H., to W & A Enterprises. Gate assembly. 4,986,031, Cl. 49-385.000.

Agnew, Stuart H.: *See*—
Agnew, Colvin H.; Wade, Weldon O.; and Agnew, Stuart H., 4,986,031, Cl. 49-385.000.

Agricultural Genetics Company Limited: *See*—
Charnley, Anthony K.; Cooper, Richard M.; and St. Leger, Raymond J., 4,987,077, Cl. 435-223.000.

Ahlborn, Guenter: *See*—
Reemtsema, Karl-Dieter; Wackermann, Peter; Ahlborn, Guenter; and Kampmann, Gerhard, 4,986,707, Cl. 410-132.000.

Ahlefeld, Marvin A. Boat engine winterizing device. 4,986,319, Cl. 141-98.000.

Aida, Satoshi; and Iwama, Nobuyuki, to Kabushiki Kaisha Toshiba. Apparatus and method for disintegrating calculus. 4,986,259, Cl. 128-24.00A.

Aida, Satoshi: *See*—
Ishida, Akinori; Aida, Satoshi; and Iwama, Nobuyuki, 4,986,275, Cl. 128-660.030.

Air Products and Chemicals, Inc.: *See*—
Nichols, James D.; and Dickenson, John B., 4,987,244, Cl. 556-89.000.

Aircraft Braking Systems Corporation: *See*—
Beck, Arnold A.; Ruof, Edgar J.; Nedelk, John; Hurley, Ralph J.; and Smithberger, Steven R., 4,986,610, Cl. 303-93.000.

Airgard, Inc.: *See*—
Johnsgard, Mark W., 4,986,838, Cl. 55-223.000.

Aisin Seiki Kabushiki Kaisha: *See*—
Akagi, Motonobu; and Okamoto, Yoshiyuki, 4,986,233, Cl. 123-634.000.
Ishikawa, Yoshiaki, 4,986,579, Cl. 292-201.000.
Nakamura, Mamoru; and Hori, Hideya, 4,987,399, Cl. 336-192.000.
Nishii, Michiharu; Mizuno, Genji; Nomura, Yoshihisa; Kato, Masahiko; Shirai, Kenji; and Tanoue, Junichi, 4,986,613, Cl. 303-114.000.
Oguma, Tomio; and Kai, Masashi, 4,986,290, Cl. 134-95.000.
Ono, Takuro, 4,986,349, Cl. 165-154.000.
Terazawa, Tadashi, 4,986,238, Cl. 123-361.000.

Aizawa, Yutaka: *See*—
Tamura, Kazuhiko; Sato, Atsushi; Aizawa, Yutaka; and Suzuki, Yoshiyuki, 4,987,424, Cl. 343-795.000.

Ajinomoto Co., Inc.: *See*—
Kobayashi, Yukio; Sasaki, Hitoshi; Matsuo, Norishige; and Ohba, Mitsuru, 4,986,995, Cl. 426-412.000.
Masaki, Hisanori; Torii, Kunio; and Suda, Tomio, 4,987,123, Cl. 514-19.000.

Akademie der Wissenschaften: *See*—
Nentwig, Jurgen; Scheller, Frieder; Hanke, Gunter; Breitmoser, Wolfgang; Weise, Hartmut; Pfeiffer, Dorothea; Nunchert, Anette; Schubert, Florian; Meiske, Christoph; and Kuhnel, Siegfried, 4,987,075, Cl. 435-182.000.

Akagi, Motonobu; and Okamoto, Yoshiyuki, to Aisin Seiki Kabushiki Kaisha. Ignition device for an engine. 4,986,233, Cl. 123-634.000.

Akedo, Jun: *See*—
Kobayashi, Hiroshi; Machida, Haruhiko; Akedo, Jun; and Funato, Hiroyoshi, 4,987,299, Cl. 250-231.140.

Akimoto, Hirofumi; Takeyama, Sadayuki; Hiki, Toshimichi; and Kondo, Masayuki, to Kyowa Leather Cloth Co., Ltd. Method for producing a laminated material. 4,986,860, Cl. 156-78.000.

Akins, Joseph F.; Goddard, Donald G.; Goszewski, Cynthia P.; and Haacke, Ernest D., to Advanced Micro Devices, Inc. Mask programmable bus control gate array. 4,987,578, Cl. 375-121.000.

Akiyama, Mamoru; Matsuyama, Takeshi; Yanagida, Yoshiyuki; and Yamashita, Akira, to Nippon Gohsei Kagaku Kogyo Kabushiki Kaisha. Pressure sensitive adhesive composition. 4,987,186, Cl. 525-107.000.

Akiyama, Mitsuo: *See*—
Ikeda, Yoshinori; Yoshida, Tadashi; Hayashi, Kimiyoshi; Abe, Shunichi; Matsuoka, Nobuo; Akiyama, Mitsuo; and Mita, Yoshinobu, 4,987,484, Cl. 358-75.000.

Akkas, Tamer; and Carlson, Ted, to Nestle S.A. Surgical cutting instrument with reciprocating inner cutter. 4,986,827, Cl. 606-107.000.

Aktiebolaget Br. Hoglund: Maskinuthyrning: *See*—
Hoglund, Nils G., 4,986,105, Cl. 72-180.000.

Aktiebolaget Electrolux: *See*—
Andreen, Gunnar B., 4,986,555, Cl. 280-47.350.

Akutsu, Yoshinori: *See*—
Saho, Takahiro; Akutsu, Yoshinori; Nakano, Takaharu; and Ohtake, Nobumasa, 4,987,203, Cl. 528-27.000.

Akzo N.V.: *See*—
Berman, Michael L.; Meissner, P. Scott; and Sisk, William P., 4,987,073, Cl. 435-172.300.

Alameddine, Bassem R., to Mobil Oil Corporation. Intermittent steam injection. 4,986,352, Cl. 166-263.000.

Albeck, Michael: *See*—
Grossman, Shlomo; and Albeck, Michael, 4,986,985, Cl. 424-195.100.

Alcan International Limited: *See*—
Schuster, David M.; Fisher, Harvey; Cinq-Mars, Pierre; and Altshuller, Bernard, 4,987,003, Cl. 427-37.000.

Alcide Corporation: *See*—
Davidson, Eugene A.; and Kross, Robert D., 4,986,990, Cl. 424-665.000.

Aldag, Reinhard; and Neumann, Peter, to BASF Aktiengesellschaft. Purification of poly(n-vinylcarbazole) containing impurities. 4,987,220, Cl. 528-491.000.

Alexander, James; and Sinanian, Robert, to Scandia Packaging Machinery Company. Assembly and method for stacking articles. 4,986,409, Cl. 198-418.400.

Alfa Lancia S.p.A.: *See*—
Gerosa, Alessandro; Rogora, Edoardo; Villa, Ezio; and Susa, Andrea, 4,987,404, Cl. 340-461.000.

Alfano, Robert R.; and Petricevic, Vladimir. Tetravalent chromium (Cr_{4+}) as a laser-active ion for tunabale solid-state lasers. 4,987,575, Cl. 372-41.000.

Alfaro, Albert. Puppet. 4,986,791, Cl. 446-361.000.

Alfonso, Giovanni C.: *See*—
Ruso, Saverio; Alfonso, Giovanni C.; Pedemonte, Enrico; Turturro, Antonio; and Martuscelli, Ezio, 4,987,189, Cl. 525-183.000.

Algra Inc.: *See*—
Cummins, Samuel P.; and Yakima, Theodore M., 4,986,717, Cl. 414-417.000.

All Tech Industries: *See*—
Patti, Anthony G.; DeHart, Larry L., Sr.; and DeHart, Larry L., Jr., 4,986,590, Cl. 296-39.200.

Allen, Michael P.; Ramel, Urs A.; and DeLizza, Anthony J., to Chemtrak Inc. Blood filtering metering device. 4,987,085, Cl. 436-169.000.

Allen, Nicholas J.: *See*—
Lowe, Christopher H.; and Allen, Nicholas J., 4,986,451, Cl. 222-189.000.

Allen, Philip M.: *See*—
Travanty, Frank C.; Allen, Philip M.; and Chopra, Vinod K., 4,987,583, Cl. 378-91.000.

Allen, Susan D., to University of Iowa Research Foundation. Method and apparatus for removing minute particles from a surface. 4,987,286, Cl. 219-121.680.

Alliance Pharmaceutical Corp.: *See*—
Long, David M., Jr., 4,987,154, Cl. 514-772.000.

Allied-Signal, Inc.: *See*—
Fleury, Jean-Luc P.; Thompson, Jerome W.; and Kanigowski, Voytek, 4,986,733, Cl. 415-230.000.
Lund, Earl A. E.; Richard, Robert G.; Shankland, Ian R.; and Wilson, David P., 4,986,930, Cl. 252-182.240.
Yates, Stephen F.; Good, Mary L.; and Brubaker, Inara M., 4,986,921, Cl. 210-758.000.

Allington, Robert W., to Isco, Inc. Chromatographic pumping method. 4,986,919, Cl. 210-656.000.

Allison, Joseph M.: *See*—
Leskovec, Robert A.; Davenport, John M.; and Allison, Joseph M., 4,987,347, Cl. 315-209.00R.

Allspach, Thomas: *See*—
Holoch, Jan; Peter, Roland; Eisenbarth, Philipp; and Allspach, Thomas, 4,987,264, Cl. 568-33.000.

Almond, Gary R.; and Storey, David W., to Data General Corporation. Methods and apparatus for performing time interleaved multiplexed rate adaptation for sub-rate channels in a digital data communication system. 4,987,570, Cl. 370-84.000.

Alpine Electronics Inc.: *See*—
Nose, Tetsuya, 4,987,605, Cl. 455-161.000.

Alps Electric Co., Ltd.: *See*—
Tsutsumi, Jyoji, 4,987,278, Cl. 200-294.000.
Yoshioka, Kenji, 4,987,340, Cl. 313-512.000.

Alps Shoji Company Limited: *See*—
Nakamura, Yoshio, 4,987,349, Cl. 318-293.000.

Alsin Seiki Kabushiki Kaisha: *See*—
Adachi, Kazunari, 4,986,740, Cl. 418-83.000.

Alten, Kurt. Inclined ramp. 4,986,405, Cl. 193-38.000.

Altman, Louis, to Bio-Imaging Research, Inc. Cam-controlled automatic dynamic focusing for computed tomography. 4,987,581, Cl. 378-19.000.

Altshuller, Bernard: *See*—
Schuster, David M.; Fisher, Harvey; Cinq-Mars, Pierre; and Altshuller, Bernard, 4,987,003, Cl. 427-37.000.

Aluminium Pechiney: *See*—
Soulier, Roger, 4,986,337, Cl. 164-420.000.

Alvarez, Eduardo: *See*—
Irby, Richard E.; Kyker, G. Stephen; DiSano, Lorenzo P.; and Alvarez, Eduardo, 4,986,511, Cl. 251-1.300.

Alza Corporation: *See*—
Ayer, Atul D.; Theeuwes, Felix; and Wong, Patrick S. L., 4,986,987, Cl. 424-473.000.

Amakawa, Shigeru: *See*—
Takasaki, Takashi; Yanai, Reikichi; Amakawa, Shigeru; Takizawa, Yoichi; and Iwamoto, Akira, 4,986,999, Cl. 426-656.000.

American Cast Iron Pipe Company: *See*—
Atkins, Tom G.; Gray, Don E.; and Styles, George H., 4,987,013, Cl. 427-233.000.

American Environmental International, Inc.: *See*—
Tandon, Jag S., 4,986,836, Cl. 55-161.000.

American National Can Company: *See*—
Schaefer, Suzanne E., 4,986,053, Cl. 53-401.000.

American Standard Inc.: *See*—
Campbell, Ernest J., 4,986,500, Cl. 248-53.000.
Tischer, James C., 4,986,085, Cl. 62-225.000.
Wood, James A.; and Mazur, Richard J., 4,987,543, Cl. 364-426.030.

Ammermann, Eberhard: *See*—
Baus, Ulf; Reuther, Wolfgang; Lorenz, Gisela; and Ammermann, Eberhard, 4,987,143, Cl. 514-383.000.

Amoco Corporation: *See*—
Pickell, Frank W.; Varesic, John Z.; Melton, M. Shannon; and Melton, Sidney H., 4,986,222, Cl. 122-6.00R.
Waynick, John A., 4,986,923, Cl. 252-25.000.

AMP Incorporated: *See*—
Adams, Charles N., III; and Morningstar, Leroy J., 4,986,769, Cl. 439-681.000.
Beinhaur, Ernest L.; Henschen, Homer E.; McKee, Michael J.; and Pawlikowski, Joseph M., 4,987,283, Cl. 219-85.110.
Bures, Milan, 4,986,662, Cl. 356-375.000.
Eaby, Daniel G.; Scholz, James P.; Shaffer, David T.; Shatto, Walter C., Jr.; and Yohn, Brent D., 4,986,764, Cl. 439-275.000.
Ferrill, Jess B.; and Simmons, Randy G., 4,986,779, Cl. 439-108.000.

Korsunsky, Iosif; Schroepfer, Richard C.; and Kopp, Monte L., 4,986,765, Cl. 439-326.000.
McGaffigan, Thomas H.; Derbyshire, Rodney L.; and Wilkerson, Douglas, 4,987,291, Cl. 219-549.000.
Weber, Ronald M., 4,985,962, Cl. 16-232.000.
Williams, Richard T.; Wrisley, David B., Jr.; and Wu, Jeff C., 4,987,006, Cl. 427-53.100.
Yamada, Hiromi; Yoshida, Eiji; and Takahasi, Kenji, 4,986,625, Cl. 350-96.200.

Amper, S.A.: *See*—
Martin, Emilio B., 4,986,523, Cl. 271-10.000.

An, Tae W.; Jung, Jong K.; Yoo, Yung C.; Lee, Pil H.; and Son, Tae W., to Tong Yang Nylon Co., Ltd; and Tong Yang Polyester Co., Ltd. Melt processable wholly aromatic polyester. 4,987,208, Cl. 528-272.000.

Anderson, David C.: *See*—
Morgan, A. Charles, Jr.; and Anderson, David C., 4,986,979, Cl. 424-1.100.

Anderson, Harry E. Water table with work supports. 4,986,515, Cl. 266-49.000.

Anderson, Irvin B. Rectal-colon dilator and collector assembly. 4,986,822, Cl. 604-276.000.

Anderson, John P., to Hartwell Corporation, The. Locking door latch. 4,986,576, Cl. 292-40.000.

Anderson, Paul R.: *See*—
Kidd, Harold J.; and Anderson, Paul R., 4,987,585, Cl. 378-197.000.

Anderson, Verne M.; and Levine, Laurence A. Urinary aid for human females. 4,986,823, Cl. 604-329.000.

Andersson, Lars-Erik: *See*—
Niemi, Ingemar; and Andersson, Lars-Erik, 4,986,374, Cl. 175-86.000.

Andersson, Norman H.: *See*—
LaRocca, Edward W.; and Andersson, Norman H., 4,986,186, Cl. 102-464.000.

Ando, Osamu: *See*—
Suzuki, Tetsumi; Murayama, Tetsuo; Ono, Hitoshi; and Ando, Osamu, 4,987,045, Cl. 430-59.000.

Ando, Yoshiyasu: *See*—
Nishida, Minoru; Mizuno, Naohito; Hattori, Tadashi; Huzino, Seizi; and Ando, Yoshiyasu, 4,986,861, Cl. 156-89.000.

Andreen, Gunnar B., to Aktiebolaget Electrolux. Carriage for handling laundry. 4,986,555, Cl. 280-47.350.

Andresen, Peter: *See*—
Meijer, Gerard; Andresen, Peter; Meier, Gerd E. A.; and Luelf, Hans W., 4,986,654, Cl. 356-43.000.

Andrews, John S.: *See*—
Rohde, Ralph; Biere, Helmut; Schmiechen, Ralph; Andrews, John S.; and Stephens, David N., 4,987,146, Cl. 514-397.000.

Angeion Corporation: *See*—
King, Wendell L.; Kane, Lawrence M.; and Adams, Theodore P., 4,986,831, Cl. 623-1.000.

Anghileri, Gianmario, to Nocacart S.p.A. Baking-tin adapted to cook and distribute sweet things such as small cakes, pudding and the like or food-stuffs in general. 4,986,432, Cl. 220-23.400.

Anno, Masahiro: *See*—
Natsuhara, Toshiya; Enoguchi, Yuji; Mizuno, Hiroshi; Anno, Masahiro; and Machida, Junji, 4,987,454, Cl. 355-259.000.

Ansaloni, Raffaele: *See*—
Dallavalle, Silvano; and Ansaloni, Raffaele, 4,987,285, Cl. 219-121.540.

ANT Nachrichtentechnik GmbH: *See*—
Ohms, Franz, 4,987,361, Cl. 323-222.000.

Anzue, Kaoru; Isomoto, Jun; and Takei, Nobuo, to NOK Corporation; and Mitsubishi Jidosha Kogyo Kabushiki Kaisha. Excluder type seal with sliding friction reducing feature. 4,986,552, Cl. 277-38.000.

AOI Chemical Inc.: *See*—
Matsufuru, Takayoshi, 4,986,862, Cl. 156-94.000.

Aoki, Hideya: *See*—
Kan, Kojiro; Tomoshige, Toru; and Aoki, Hideya, 4,987,214, Cl. 528-317.000.

Aoki, Kunimitsu; Miyazawa, Yasuhiro; Ichikawa, Hiroshi; and Furuya, Yoshiyuki, to Yazaki Corporation. Automotive display system. 4,986,631, Cl. 350-112.000.

Aoki, Masayuki, to Kabushiki Kaisha Toshiba. Heating cooking appliance with relay testing. 4,987,556, Cl. 364-580.000.

Aoki, Yuji; and Watanabe, Makoto, to Monsanto Kasei Company. Impact resistant thermoplastic resin composition. 4,987,185, Cl. 525-66.000.

Apfel, Stephen M. Self contained device for giving audible messages to occupants of a vehicle. 4,987,403, Cl. 340-457.000.

Apke, Robert J.: *See*—
Gunn, Charles L.; and Apke, Robert J., 4,986,420, Cl. 206-607.000.

Apple, Glenn D.; Saltzman, Robert S.; and Sennet, Stewart W. Photometric analyzer and controller for beverages. 4,987,083, Cl. 436-55.000.

Arai, Hitoshi, to Canon Kabushiki Kaisha. Image processing apparatus with image formation condition detection for control of processing. 4,987,495, Cl. 358-448.000.

Arai, Masatoshi: *See*—
Inoue, Yoshio; Arai, Masatoshi; and Kimura, Tsuneo, 4,987,155, Cl. 521-77.000.

Arai, Nobukatsu: *See*—
Sekine, Yoshihito; Arai, Nobukatsu; Osawa, Tadao; Tokuda, Hiroatsu; Usui, Toshifumi; and Tsutsui, Mitsukuni, 4,986,115, Cl. 73-118.200.

Arai, Yasuyuki: *See*—
Suzuki, Kunio; Fukada, Takeshi; Kinka, Mikio; Abe, Masayoshi; Shibata, Katsuhiko; Susukida, Masato; Ishida, Noriya; Satake, Akemi; and Arai, Yasuyuki, 4,987,005, Cl. 427-39.000.
Takahashi, Yutaka; Harashima, Ikuo; Nakayama, Shunichi; Arai, Yasuyuki; Takayanagi, Yasushi; Sekiguchi, Ryoichi; Abe, Tomomitsu; and Hayakawa, Hiroshi, 4,986,448, Cl. 222-129.100.

Araps, Constance J.; Casey, Jon A.; Divakaruni, Renuka S.; Kandetzke, Steven M.; and Lotako, Chatherine A., to International Business Machines Corporation. Phenyl-endcapped depolymerizable polymer. 4,987,211, Cl. 526-251.000.

Ariizumi, Takashi: *See*—
Masuda, Sadakazu; Fujita, Fumio; Kamata, Masamoto; Yoshini, Masahiko; Ariizumi, Takashi; Okami, Yuji; Takada, Yoshikazu; and Inagaki, Junichi, 4,986,341, Cl. 164-477.000.

Arikawa, Teturo, to Nippon A B S, Ltd. Brake fluid pressure control apparatus for a vehicle. 4,986,612, Cl. 303-110.000.

Arison, Byron H.: *See*—
Chen, Shieh-Shung T.; Wicker, Linda S.; and Arison, Byron H., 4,987,139, Cl. 514-321.000.

Arizona Board of Regents: *See*—
Pettit, George R.; and Kamano, Yoshiaki, 4,986,988, Cl. 424-520.000.

Arlt, Wolfgang; Waniczek, Helmut; Viard, Richard; and Bruck, Dieter, to Bayer Aktiengesellschaft. Process for the production of monomeric α-cyanoacrylates. 4,986,884, Cl. 203-8.000.

Arthur D. Little, Inc.: *See*—
Marcus, Beth; Lawrence, W. Thompson; and Churchill, Philip, 4,986,280, Cl. 128-774.000.

Arthurs, Raymond C. Bag bottle carrier. 4,986,416, Cl. 206-170.000.

Asabuki, Hideyo: *See*—
Teramoto, Mitsutake; Saito, Shinkichi; Okumoto, Takaharu; and Asabuki, Hideyo, 4,986,541, Cl. 273-77.00A.

Asada, Eiichi; Yamazoe, Mikio; and Matsumura, Shigeru, to Shoei Chemical Inc. Resistor composition. 4,986,933, Cl. 252-518.000.

Asahi Glass Company, Ltd.: *See*—
Watabe, Takashi; Takeyasu, Hiromitsu; Doi, Takao; and Kunii, Nobuaki, 4,987,271, Cl. 568-621.000.

Asahi Kasei Kogyo Kabushiki Kaisha: *See*—
Ryu, Ushio; Ono, Hideo; Kabashima, Kengi; Masushige, Yutaka; Matsuo, Teruhiko; and Koyanagi, Tadashi, 4,986,483, Cl. 242-45.000.

Asahi Kogaku Kogyo K.K.: *See*—
Soshi, Isao; Sato, Osamu; and Naruo, Teruhiko, 4,987,434, Cl. 354-106.000.

Asahi Kogaku Kogyo Kabushiki Kaisha: *See*—
Chikama, Atsushi, 4,987,448, Cl. 355-205.000.
Misawa, Masayuki, 4,987,436, Cl. 354-203.000.

Asahi, Nobuo: *See*—
Ozaki, Seishiro; and Asahi, Nobuo, 4,987,395, Cl. 335-17.000.

Asakawa, Teruo, to Tokyo Electron Limited. Stock unit for storing carriers. 4,986,715, Cl. 414-331.000.

Asakura, Naoichi: *See*—
Hikosaka, Akihiro; Sakai, Hitoshi; Yoshihara, Takayoshi; and Asakura, Naoichi, 4,987,451, Cl. 355-245.000.

Asano, Tamotsu: *See*—
Gohbara, Masatoshi; Asano, Tamotsu; Ozawa, Shuji; Yamazaki, Hideo; Ishii, Tsutomu; Nishida, Makoto; Watanabe, Junko; and Sato, Naoki, 4,986,846, Cl. 71-92.000.

Asaoka, Takemitsu: *See*—
Kanamaru, Yoshihiko; Tokizawa, Minoru; Matsumoto, Masaru; Asaoka, Takemitsu; Matsuda, Hideaki; and Kuraishi, Tadayuki, 4,987,144, Cl. 514-383.000.

Asea Brown Boveri Ltd.: *See*—
Garbe, Heyno; and Konigstein, Dietrich, 4,986,701, Cl. 408-1.00R.
Hirth, Michael; Jochum, Joachim; and Wieckert, Christian, 4,986,347, Cl. 165-94.000.
Hirth, Michael; and Mechtersheimer, Gunter, 4,986,968, Cl. 422-186.190.

Ashley, Charles R.; Crossman, Russell J.; Hennessy, John P.; and Lahm, William J., to Vistakon, Inc. Container for a number of packaged contact lenses. 4,986,414, Cl. 206-5.100.

Asq. Boats, Inc.: *See*—
Lee, Steven N., 4,987,407, Cl. 340-540.000.

AST Research, Inc.: *See*—
Craft, Thomas W.; Herrin, Bradley T.; and Ludwig, Thomas E., 4,987,529, Cl. 364-200.000.

Astley, Graham J.: *See*—
Belanger, Michael J.; and Astley, Graham J., 4,985,957, Cl. 15-53.300.

AT&T Bell Laboratories: *See*—
Easter, William G.; and Feygenson, Anatoly, 4,987,471, Cl. 357-49.000.

Athale, Ravindra A., to United States of America, Navy. High accuracy digital acousto-optic matrix computer. 4,986,640, Cl. 350-358.000.

Atkins, Tom G.; Gray, Don E.; and Styles, George H., to American Cast Iron Pipe Company. Process for lining pipe. 4,987,013, Cl. 427-233.000.

Atkinson, Gordon E.: *See*—
Bailey, James C.; Atkinson, Gordon E.; and Boehmer, Dennis A., 4,986,310, Cl. 137-859.000.

Atlas Powder Company: *See*—
Jacob, Merritt; Oswald, Gerald L.; and Goffin, Glen P., II, 4,986,183, Cl. 102-200.000.

Atochem North America, Inc.: *See*—
Sandler, Stanley R., 4,987,249, Cl. 562-102.000.
Atsumi, Yasuhiko: *See*—
Nakamura, Kiichi; Itakura, Masami; Atsumi, Yasuhiko; Watanabe, Hideo; and Kanagawa, Youiti, 4,987,009, Cl. 427-96.000.
Atwood, B. Dale: *See*—
Shreeve, Robert W.; and Atwood, B. Dale, 4,987,365, Cl. 324-158.00F.
Audi AG: *See*—
Bader, Heinz; and Sterler, Georg, 4,987,276, Cl. 200-61.45M.
Auge, Jacques; and Beaufume, Pascale, to Societe Anonyme dite: Compagnie Generale d'Electricite. Monomode optical fiber with protection against tapping of transmitted information, and a transmission method using said fiber. 4,986,629, Cl. 350-96.330.
Augustiniak, Hermann: *See*—
Reichenbach, Hans; Hofle, Gerhard; Augustiniak, Hermann; Bedorf, Norbert; Gerth, Klaus; Irschik, Herbert; Jansen, Rolf; Kunze, Brigitte; Schomburg, Dietmar; Steinmetz, Heinrich; Trowitzsch-Kienast, Wolfram; and Wray, Victor, 4,987,072, Cl. 435-119.000.
Auld, David J.: *See*—
Steer, Peter L.; Wiltshire, Neil P.; and Auld, David J., 4,986,824, Cl. 604-333.000.
Ault, Kenneth A.: *See*—
Brosnan, Jeanne M.; and Ault, Kenneth A., 4,987,086, Cl. 436-501.000.
Austin, John S.; and Gruenberg, Jeff D., to Unidynamics Corporation. System for attaching a fitting to a tube. 4,985,975, Cl. 29-283.500.
Australian Electro Optics Pty Ltd.: *See*—
Hughes, John L., 4,987,376, Cl. 330-4.300.
Automatic Bar Controls, Inc.: *See*—
Valiyee, Mojtaba; Martindale, William A.; and Martindale, Richard A., 4,986,449, Cl. 222-144.500.
Automobiles Citroen: *See*—
Galtier, Lucien; Barthelemy, Andre; and Herbreteau, Roger, 4,986,568, Cl. 280-707.000.
Automobiles Peugeot: *See*—
Galtier, Lucien; Barthelemy, Andre; and Herbreteau, Roger, 4,986,568, Cl. 280-707.000.
Automotive Systems Laboratory, Inc.: *See*—
Bruton, William J., 4,986,569, Cl. 280-743.000.
White, Craig W.; and Musser, Kevin E., 4,987,316, Cl. 307-10.100.
Avidan, Amos A.; and Chin, Arthur A., to Mobil Oil Corp. Method for passivating metals on an FCC catalyst. 4,986,896, Cl. 208-52.0CT.
AVL Gesellschaft fur Verbrennungskraftmaschinen und Messtechnik m.b.H. Prof.Dr.Dr.H.c. Hans List: *See*—
Ruckenbauer, Friedrich; and Winkler, Josef, 4,986,129, Cl. 73-756.000.
Awaji, Hiroshi: *See*—
Uekita, Masakazu; and Awaji, Hiroshi, 4,987,219, Cl. 528-353.000.
Ayer, Atul D.; Theeuwes, Felix; and Wong, Patrick S. L., to Alza Corporation. Pulsed drug delivery. 4,986,987, Cl. 424-473.000.
Azuma, Makoto: *See*—
Sato, Itsuko; Naito, Katsuyuki; Genma, Nobuhiro; and Azuma, Makoto, 4,987,023, Cl. 428-215.000.
B.A.T. Cigarettenfabriken GmbH: *See*—
Schneider, Werner; Borowski, Horst; Kausch, Erwin; Kutting, Rolf; Meyer, Meinhard; Moller, Knut; Muller, Bernd-Henrik; and Schluter, Adolf, 4,986,287, Cl. 131-360.000.
Bastz, Henning; and Rittscher, Dieter, to GNS Gesellschaft fur Nuklear-Service mbH. Method of and apparatus for the storage of radioactive waste. 4,987,313, Cl. 250-506.100.
Baba, Noriaki: *See*—
Mouri, Kaneo; Wakuda, Masahide; and Baba, Noriaki, 4,987,390, Cl. 332-173.000.
Babcock Industries, Inc.: *See*—
Gokee, Doanld J., 4,986,399, Cl. 192-4.00A.
Babcock & Wilcox Company, The: *See*—
Larson, Jeffrey G., 4,986,960, Cl. 376-446.000.
Baccus, John B., Jr., to Southland Corporation, The. Process for making a low calorie beverage. 4,986,994, Cl. 426-330.300.
Bachalo, William D., to Aerometrics, Inc. Method for measuring the size and velocity of spherical particles using the phase and intensity of scattered light. 4,986,659, Cl. 356-336.000.
Baciak, Mark G., to United States of America, Air Force. Digital position monitor. 4,987,293, Cl. 250-206.100.
Backer, Bruce E. Component exhibit system. 4,986,038, Cl. 52-71.000.
Bader, Heinz; and Sterler, Georg, to Audi AG. Deceleration switch. 4,987,276, Cl. 200-61.45M.
Baertschi, Alex J.; and Niskanen, Eero, to Center for Innovative Technology; and University of Virginia. Erythropoietic factor. 4,987,121, Cl. 514-8.000.
Bai, Shen H., to Farley, Inc. Bottom vertical slide on a horizontal movable die of a vertical injector die casting machine. 4,986,334, Cl. 164-312.000.
Baik, Soung K.: *See*—
Han, Yong N.; Han, Byung H.; Baik, Soung K.; and Kim, Tae H., 4,987,125, Cl. 514-33.000.
Bailey, Francis V.: *See*—
Irgens, Christopher R.; and Bailey, Francis V., 4,986,942, Cl. 264-51.000.
Bailey, James C.; Atkinson, Gordon E.; and Boehmer, Dennis A., to Vernay Laboratories, Inc. Low pressure check valve. 4,986,310, Cl. 137-859.000.
Bailey, Michael A.: *See*—
Costin, C. Richard; and Bailey, Michael A., 4,986,940, Cl. 264-3.100.
Baker Hughes Incorporated: *See*—
Meurer, Charles L., 4,986,141, Cl. 74-89.220.
Meurer, Charles L., 4,986,915, Cl. 210-527.000.
Baker, John L.: *See*—
Lowder, James E.; Shinn, Ronald R.; and Baker, John L., 4,986,721, Cl. 414-685.000.
Bala, Kiran: *See*—
Khanna, Jagmohan; Bala, Kiran; and Grover, Inder P. S., 4,987,242, Cl. 556-23.000.
Baldwin/Green Inc.: *See*—
Laramore, Michael D., 4,986,805, Cl. 493-199.000.
Ball, Norman: *See*—
Ramakrishnan, Ramani; and Ball, Norman, 4,986,170, Cl. 98-33.100.
Balm, Martinus A.: *See*—
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Bannai, Kazunori; Koizumi, Yutaka; and Mamizuka, Mitsuru, to Ricoh Company, Ltd. Color image forming apparatus. 4,987,428, Cl. 346-157.000.
Banyu Pharmaceutical Co., Ltd.: *See*—
Ushijima, Ryosuke; Nakagawa, Susumu; and Mano, Eiichi, 4,987,235, Cl. 548-430.000.
Bar Ilan University: *See*—
Grossman, Shlomo; and Albeck, Michael, 4,986,985, Cl. 424-195.100.
Barabolak, Roman M.: *See*—
Yatka, Robert; Prombo, Patrick; Barabolak, Roman M.; Zibell, Steven; and McGrew, Gordon N., 4,986,991, Cl. 426-3.000.
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Bargiotti, Alberto; Suarato, Antonino; Zini, Pierangelo; Grandi, Maria; and Pezzoni, Gabriella, to Farmitalia Carlo Erba S.R.L. 3'-deamino-4'-deoxy-4'-amino anthracyclines. 4,987,126, Cl. 514-34.000.
Barlow, Stuart M.; Gunstone, Frank D.; Hardy, Roy; and Thorisson, Snorri, to University of St. Andrews. Ethoxyquin derivatives as antioxidants in edible oils and fish meal. 4,986,996, Cl. 426-545.000.
Barmag AG: *See*—
Hahmann, Wolfgang; Kirchhoff, Johannes; and Sandkuhler, Georg, 4,986,074, Cl. 60-468.000.
Barrico Limited: *See*—
Broomhall, Keith, 4,986,747, Cl. 425-519.000.
Barris, Marty A.; and Wagner, Wayne M., to Donaldson Company, Inc. Engine exhaust particle trap captured mass sensor. 4,986,069, Cl. 60-274.000.
Barron, Robert C. Water sensor system. 4,987,408, Cl. 340-604.000.
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Gelardi, Anthony L.; Lovecky, Craig; Lowry, Alan; and Barstow, Robert, 4,986,491, Cl. 242-199.000.
Barthelemy, Andre: *See*—
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Baus, Ulf; Reuther, Wolfgang; Lorenz, Gisela; and Ammermann, Eberhard, 4,987,143, Cl. 514-383.000.
Bott, Kaspar; Hoffman, Herwig; and Scheidmeir, Walter, 4,987,270, Cl. 568-905.000.
Dobler, Walter; Eggersdorfer, Manfred; and Paust, Joachim, 4,987,229, Cl. 544-243.000.
Goerrissen, Heiner; Heinz, Gerhard; Hilt, Albrecht; and Simon, Georg N., 4,987,176, Cl. 524-456.000.
Holoch, Jan; Peter, Roland; Eisenbarth, Philipp; and Allspach, Thomas, 4,987,264, Cl. 568-33.000.
Batey, John; Tiwari, Sandip; and Wright, Steven L., to International Business Machines Corp. Method of making unpinned oxide-compound semiconductor structures. 4,987,095, Cl. 437-106.000.
Bath Scientific Limited: *See*—
Watts, Vivian C., 4,987,364, Cl. 324-158.00P.
Battelle Memorial Institute: *See*—
Bichon, Daniel; Guillot, Christian; and Schneider, Michel, 4,987,181, Cl. 525-54.100.
Bunnell, Lee R., Sr., 4,987,175, Cl. 524-449.000.
Bauer Industries Inc.: *See*—
Shaw, Daniel C., 4,985,944, Cl. 4-664.000.
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Wittmann, Dieter; Lindner, Christian; Damrath, Volker; Kress, Hans-Jurgen; Peters, Horst; and Schoeps, Jochen, 4,987,184, Cl. 525-63.000.
Bayer Aktiengesellschaft: *See*—
Arlt, Wolfgang; Waniczek, Helmut; Viard, Richard; and Bruck, Dieter, 4,986,884, Cl. 203-8.000.
Denecker, Gabriel; Verhoeven, Werner; Leuridan, Joel; and Sluyts, Domien, 4,986,742, Cl. 423-82.000.

Jonas, Friedrich; Heywang, Gerhard; Schmidtberg, Werner; Heinze, Jurgen; and Dietrich, Michael, 4,987,042, Cl. 429-213.000.

Lantzsch, Reinhard; and Steinbeck, Karl, 4,987,251, Cl. 562-506.000.

Bayer, Arthur C.: *See*—
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Bayerische Motoren Werke AG: *See*—
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Bays, F. Barry; and Trott, Arthur F., to Concept, Inc. Surgical cutting instrument. 4,986,825, Cl. 604-22.000.

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Becerril, Philippe: *See*—
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Beck, Arnold A.; Ruof, Edgar J.; Nedelk, John; Hurley, Ralph J.; and Smithberger, Steven R., to Aircraft Braking Systems Corporation. Brake system with brake selection means. 4,986,610, Cl. 303-93.000.

Becker, Mark: *See*—
Heim, Frederick L.; Becker, Mark; Dullinger, Craig A.; Gnifkowski, Edward J.; Gohl, Roger M.; and Weber, John D., 4,986,864, Cl. 156-201.000.

Becker, Wilhelm; Godau, Claus; and Dreischhoff, Dieter, to Hoechst AG. Stable aqueous epoxy resin dispersion, process for the preparation thereof and use thereof. 4,987,163, Cl. 523-414.000.

Beckhusen, Gerard F., to Carrier Corporation. Quench expansion valve refrigeration circuit. 4,986,084, Cl. 62-197.000.

Beckman, Gary D., to Fisher Controls International, Inc. Raised face flange alignment tool. 4,986,574, Cl. 285-24.000.

Beckman Instruments: *See*—
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Becton, Dickinson and Company: *See*—
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Imbert, Claude; Jouet, Jean M.; and Carre, Patrick, 4,986,818, Cl. 604-192.000.

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Cassidy, Frederick; and Stemp, Geoffrey, 4,987,138, Cl. 514-320.000.

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Hoeltje, Dagmar; and Thielke, Dietrich, 4,987,137, Cl. 514-294.000.

Bech, Michael D.: *See*—
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Belanger, Inc.: *See*—
Belanger, Michael J.; and Astley, Graham J., 4,985,957, Cl. 15-53.300.

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Bell Communications Research, Inc.: *See*—
Colas, Etienne G.; and Cox, Herbert M., 4,987,094, Cl. 437-81.000.

Bell, David W., to Conoco Inc. Seismic imaging of steeply dipping geologic interfaces. 4,987,561, Cl. 367-53.000.

Bell, Gary M., to Kapak Corporation. Resealable bag arrangement and method. 4,986,673, Cl. 383-61.000.

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Robinson, Madison K., 4,986,735, Cl. 416-134.00A.

Bell & Howell Phillipsburg Company: *See*—
Rabindran, K. George; Filicicchia, David; and Guenther, Kenneth L., 4,987,547, Cl. 364-478.000.

Bell, James A. E., to Inco Limited. Polymetallic piston-cylinder configuration for internal combustion engines. 4,986,234, Cl. 123-193.0CP.

Bellamy, Alain; and Chauvet, Ludovic, to Hutchinson. Hydraulic antivibratory devices. 4,986,510, Cl. 248-562.000.

Bellanca, Charles P., to Dayton Power and Light Company. Main steam by-pass valve. 4,986,309, Cl. 137-630.140.

Bellis, Harold E.: *See*—
Clark, Charles R.; Whitfill, Donald L.; Cords, D. Philip; McBride, Edward F.; and Bellis, Harold E., 4,986,353, Cl. 166-279.000.

Bemis Manufacturing Company: *See*—
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Benker, Gerhard; Nitsch, Wilhelm; Payrhammer, Bernd; Weinert, Volker; Treiber, Helmut; and Kluter, Ulrich, to Agfa Gevaert AG. Method of and apparatus for positioning image areas of film. 4,987,440, Cl. 355-41.000.

Bennett, Robert R.: *See*—
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Benninger AG: *See*—
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Benson, Glenn S. Golf putter. 4,986,544, Cl. 273-183.00D.

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Walker, Julie L.; and Benton, Stephen A., 4,986,619, Cl. 350-3.610.

Benuzzi, Gino, deceased; and by Benuzzi, Piergiorgio, heir. Plant for automatically stacking and orderly arranging packs of panels of different sizes. 4,986,726, Cl. 414-789.100.

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Benuzzi, Gino, deceased; and Benuzzi, Piergiorgio, heir, 4,986,726, Cl. 414-789.100.

Berci, George. Video system for visualizing microsurgical images with enhanced depth of field. 4,987,488, Cl. 358-93.000.

Berger, Thomas W., to Minnesota Mining and Manufacturing Company. Self cleaning apparatus for preparing aqueous air foams. 4,986,667, Cl. 366-173.000.

Bergeron, Raymond J., to University of Florida. Method for the synthesis of desferrioxamine B and analogs thereof. 4,987,253, Cl. 562-623.000.

Bergersen, Earl O. Infant guidance pacifier appliance. 4,986,751, Cl. 433-6.000.

Bergonzoni, Carlo; Cavioni, Tiziana; and Crisenza, Giuseppe P., to SGS-Thomson Microelectronics s.r.l. Fabrication of CMOS devices with reduced gate length. 4,987,088, Cl. 437-34.000.

Berman, Arthur L.; and Lewis, Thomas M., to Kaiser Aerospace & Electronics Corporation. Multiple image forming apparatus. 4,987,410, Cl. 340-705.000.

Berman, Michael L.; Meissner, P. Scott; and Sisk, William P., to Akzo N.V. Bacteriophage cloning system for the construction of directional DNA libraries. 4,987,073, Cl. 435-172.300.

Bernard, Alain; and Stordiau, Marc, to Hydro Soil Services. Method for raising any object lying on the bottom of the sea, a river or basin, and apparatus used thereby. 4,986,203, Cl. 114-51.000.

Bernard, Gebelin, to Framatome; and Cogema. Device for the support and positioning of means for checking and tools for working on fuel assemblies. 4,986,953, Cl. 376-245.000.

Bernier, Roland: *See*—
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Berrebi, Georges; and Ackermann, Francois, to Europeenne de Retraitement. Process and apparatus for separating materials of different shapes or sizes. 4,986,424, Cl. 209-691.000.

Berthold, Werner; Haseler, Helmut; Marx, Paul; Meckl, Heinz; and Ohischlager, Hans, to Agfa-Gevaert Aktiengesellschaft. Process for stabilizing photographic silver images. 4,987,059, Cl. 430-428.000.

Bertini, Paolo, to Siemens Aktiengesellschaft. Injection valve. 4,986,478, Cl. 239-585.000.

Bertolini, Carlo; and Becerril, Philippe, to Rockwell-CIM. Device for a sliding coupling between a window and a window-raiser mechanism in a vehicle. 4,986,030, Cl. 49-351.000.

Bertone, Christian: *See*—
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Bertschi, Rene, to Husky Injection Molding Systems Ltd. Anti-collision method and apparatus for an injection mold. 4,986,944, Cl. 264-40.500.

Bessho, Kazuo, to Kanazawa University. Multilayered eddy current type power-saved intense AC magnetic field generator. 4,987,398, Cl. 335-299.000.

Beyerle, Rudi: *See*—
Schonafinger, Karl; Beyerle, Rudi; Schindler, Ursula; Jablonka, Bernd; and Troke, Jeffery, 4,987,134, Cl. 514-252.000.

Beynon, Thomas G. R., to Land Infrared Limited. Radiation thermometer. 4,986,672, Cl. 374-131.000.

Bezdek, William J. Food spill catching and serving device. 4,985,932, Cl. 2-049.00A.

Bhattacherjee, Arya: *See*—
Malazgirt, Alp; Padmakumar, Bala; and Bhattacherjee, Arya, 4,986,878, Cl. 156-643.000.

Bibbee, E. Bruce. Mailbox delivery signal apparatus. 4,986,467, Cl. 232-34.000.

Bichon, Daniel; Guillot, Christian; and Schneider, Michel, to Battelle Memorial Institute. Substrate with an antithromogenic active surface. 4,987,181, Cl. 525-54.100.

Bienert, Walter B.; Jopson, Edward J.; and Lanza, Richard J., to United States of America, Army. Heat pipe convection oven. 4,986,253, Cl. 126-21.00A.

Biere, Helmut: *See*—
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Biffi Italia S.r.l.: *See*—
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Big Chill, Inc.: *See*—
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Bill's Ice Cream, Inc.: *See*—
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Binversie, Gregory J.; and Macier, James E., to Outboard Marine Corproation. Trim adjustment arrangement for marine propulsion device. 4,986,773, Cl. 440-61.000.

Bio-AgriTech, Inc.: *See*—
Peek, Thomas W.; and Floyd, John B., 4,986,024, Cl. 43-107.000.

Bio-Imaging Research, Inc.: *See*—
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Biomet, Inc.: *See*—
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Bishop, Gary D.; Campbell, Melvin L.; and Shaw, James E., to Rockwell International Corporation. Liquid crystal display heating system. 4,987,289, Cl. 219-209.000.
Bitter, Johan G. A.; den Boestert, Johannes L. W. C.; and Weeres, Wilhelmus J. M., to Shell Oil Company. Process for the separation of a phenol. 4,987,273, Cl. 568-758.000.
Bizjak, John; Hassel, Michael; and Niemann, David, to Brier Technology, Inc. Self compensating high density data recording and detection scheme. 4,987,500, Cl. 360-46.000.
Blackburn, William A., to Abandaco, Inc. Belt assembly for sizingly adjusting the crotch region of a garment. 4,985,937, Cl. 2-312.000.
Blackmon, James B.; Cady, Edwin C.; and Jones, Nelson E., to McDonnell Douglas Corporation. Moving belt radiator heat exchanger. 4,986,346, Cl. 165-86.000.
Blake, Joseph W., III; and Sloane, Thomas E., Jr., to MadTech Group, Inc., The. Disposable hypodermic syringe. 4,986,813, Cl. 604-110.000.
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Blanchard, Jean-Marie, to Tubauto. Irreversible continuous pivotal connection. 4,986,602, Cl. 297-362.000.
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Block Drug Co., Inc.: *See*—
Chang, Tiang-shing; and Marchese, Lisa N. W., 4,986,754, Cl. 433-224.000.
Blohm, Knud; and Hornsleth, Steen, to Danfoss A/S. Method and circuit for controlling the speed of an object moveable by a drive. 4,987,546, Cl. 364-474.300.
Blomdahl, Karl, to Lars Blomdahl AB. Ear piercing device. 4,986,829, Cl. 606-188.000.
Bloom, Leonard: *See*—
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Blumenthal, Oreste, to Giuseppe Ratti Industria Ottica S.p.A. Decoration for spectacle frames of plastics material and a method for its application. 4,986,647, Cl. 351-51.000.
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Boehringer, John R.; and Aff, John, to Boehringer Laboratories. Ink stamp apparatus and kit. 4,986,175, Cl. 101-125.000.
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Boge AG: *See*—
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Bogner, Karl-Heinz, to Robert Bosch GmbH. Electromagnetic switch, in particular for starting devices of internal-combustion engines. 4,987,396, Cl. 335-126.000.
Bohlendorf, Bettina; Bedorf, Norbert; Hofle, Gerhard; Schummer, Dietmar; and Sutter, Marius, to Gesellschaft fur Biotechnologische Forschung mbh, Braunschweig; and Ciba-Geigy Corporation. Soraphen compounds and their use as microbicides. 4,987,149, Cl. 514-450.000.
Bohm, Georg G. A.: *See*—
Oberster, Arthur E.; Roland, Charles M.; and Bohm, Georg G. A., 4,987,192, Cl. 525-274.000.
Bohnhoff, William W. Soil filtration and water drainage device. 4,986,699, Cl. 405-50.000.
Bollen, Manfred, to Benninger AG. Thread braking mechanism with catchment device. 4,986,489, Cl. 242-151.000.
Bollman, Clifford J. Multi-adjustable, multi-functional, space saving workplace system. 4,986,194, Cl. 108-111.000.
Bonfiglioli, Silverio; and Fato, Massimo, to Weber S.r.l. Electronic fuel injection system for an internal combustion engine. 4,986,242, Cl. 123-479.000.
Bongenaar, Hendrik; and van der Avoort, Henricus J. M., to U.S. Philips Corporation. Color display tube having a color selection electrode with resilient support. 4,987,337, Cl. 313-406.000.
Bonneau, Lionel, to Rhone-Poulenc Chimie. Organotin fluorides having controlled morphology. 4,987,245, Cl. 556-104.000.
Bonnebat, Claude; Quentin, Jean-Pierre; and Morin, Alain, to Rhone-Poulenc Chimie. Highly oriented thermotropic magnetic recording medium. 4,987,020, Cl. 428-64.000.
Bonnet, Jean, to Societe des Jeux d'Aquitaine. Game board for practicing aspects of bowls, billiard and petanque. 4,986,542, Cl. 273-118.00R.
Bonneville International Corporation: *See*—
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Booth, Roger; and Heidt, Thomas D., to Lionel Trains, Inc. Toy vehicle assembly with video display capability. 4,986,187, Cl. 104-84.000.
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Brosh, Amnon; and Landmann, Wolf S., 4,987,389, Cl. 331-167.000.
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Borisch, Fred; and Kreisel, Georg. Weaving machine with a synchronously or independently operable mechanical dobby. 4,986,315, Cl. 139-66.00R.
Bornstein, Aharon; and Cinader, Gideon, to State of Israel, Atomic Energy Commission, Soreg Nuclear Research Center. Infra-red sensing system. 4,987,305, Cl. 250-352.000.
Borodin, Fedor N.; Gorfinkel, Solomon L; and Kurzel, Iosif; A. Control mechanism for compound transmission of transport vehicle. 4,986,142, Cl. 74-473.00R.
Borowski, Horst: *See*—
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Borst, Rodney D., to Placon Corporation. Recloseable nesting tab container. 4,986,438, Cl. 220-315.000.
Borzatta, Valerio: *See*—
Cantatore, Giuseppe; and Borzatta, Valerio, 4,987,228, Cl. 544-198.000.
Boscher, Daniel; Le Marer, Rene ; and Perrin, Gabrielle, to Etat Francais (Centre National d'Etudes des Telecommunications). Method for connecting optical fibres without Fresnel reflection and system thus detained, variable optical attenuator and system using this attenuator to measure the effect of the reflection coeficient on an optical line. 4,986,627, Cl. 350-96.210.
Bossard, Ronald G., to Minnesota Mining and Manufacturing Company. Optical fiber termination module. 4,986,626, Cl. 350-96.200.
Bott, Kaspar; Hoffman, Herwig; and Scheidmeir, Walter, to BASF Aktiengesellschaft. Preparation of 3-arylisobutyl alcohols. 4,987,270, Cl. 568-905.000.
Bouko, Jean, to Thomson-CSF. Wide band loop antenna with disymmetrical feeding, notably antenna for transmission, and array antenna formed by several such antennas. 4,987,423, Cl. 343-741.000.
Bourin, Jean-Michel; Mourlevat, Jean-Lucien; and Sengler, Gilbert, to Framatome. Protection system for protecting a nuclear reactor in the event of a reaction-inhibiting element falling. 4,986,952, Cl. 376-215.000.
Boury, Bradley J. Rotatable disk string toy. 4,986,790, Cl. 446-253.000.
Boutilier, M. Gaylord. Ball journal device for connecting a shaft to a harness. 4,986,059, Cl. 54-2.000.
Boutin, Gaetan, deceased: *See*—
Leblanc, Roland; and Boutin, Gaetan, deceased, 4,986,600, Cl. 297-238.000.
Bowers, Kenneth E., to Marshall E. Wisner. Portable pump removal equipment. 4,986,351, Cl. 166-85.000.
Boyle, Dennis J., to Dynabook Technologies Cororation. Contact strip-to-flex bushing connector. 4,986,763, Cl. 439-165.000.
Boze, Ronald A.: *See*—
Canzoneri, Anthony S.; and Boze, Ronald A., 4,986,903, Cl. 210-90.000.
BP Chemicals Limited: *See*—
Duncan, W. Alexander S., 4,987,179, Cl. 524-762.000.
BP Chimie Societe Anonyme: *See*—
Morterol, Frederic; and Vidal, Jean-Louis, 4,987,212, Cl. 526-348.400.
Braas GmbH: *See*—
Weisweiler, Manfred; and Jost, Gunter, 4,986,744, Cl. 425-94.000.
Braat, Josephus J. M., to U.S. Philips Corp. Retrofocus objective lens and optical scanning device provided with such a lens. 4,986,641, Cl. 350-432.000.
Braedle, Gilbert; Cromer, Paul; and Huck, Francis, to H.I. Holweg International. Gusset tubing former. 4,986,806, Cl. 493-468.000.
Braendle, Jurg G.; and Saur, Wolfgang, to Gurit-Essex AG. Method of manufacturing a prefabricated vehicle window. 4,986,867, Cl. 156-244.110.
Braig, Albert: *See*—
Zahn, Rudolf; Schroeder, Hans W.; Borgwardt, Christian; Braig, Albert; Helwig, Gunter; and Dittrich, Kay, 4,987,425, Cl. 343-853.000.
Brais, Raymond, to Walsh & Brais Inc. Extensible conveyor system. 4,986,412, Cl. 198-592.000.
Bramkamp, Wilhelm; and Hegner, Gunter, to Krone AG. Plug connector for telecommunication and data systems. 4,986,768, Cl. 439-680.000.

Branam, Timothy R. Electronic torque switch. 4,987,358, Cl. 318-603.000.

Brassert, Walter L.: *See*—
Swarden, Michael C.; Faulkner, Henry B.; Brassert, Walter L.; and Stoudt, James E., 4,986,479, Cl. 241-15.000.

Braswell, Richard R., to Richards-Braswell Research Corporation, The. Clamping device. 4,986,771, Cl. 439-790.000.

Brauer, Michael C.: *See*—
Santos, A. John; and Brauer, Michael C., 4,987,415, Cl. 341-15.000.

Braun Aktiengesellschaft: *See*—
Hahnewald, Andrea; Mothrath, Georg; Schamberg, Stefan; and Ullrich, Volker, 4,986,173, Cl. 99-338.000.

Braun, Franz-Josef, to Frankische Rohrwerk Gebr. Kirchner GmbH & Co. Plastic protective tube arrangement for lines. 4,986,575, Cl. 285-325.000.

Braun, Robert E.; and Gibbs, Ronald T., to Unisys Corporation. Micro individual integrated circuit package. 4,987,478, Cl. 357-81.000.

Breitbard, Gary: *See*—
Moore, Wayne A.; Nozaki, Tom, Jr.; Parks, David R.; Stovel, Richard T.; and Breitbard, Gary, 4,987,539, Cl. 364-413.080.

Breitmoser, Wolfgang: *See*—
Nentwig, Jurgen; Scheller, Frieder; Hanke, Gunter; Breitmoser, Wolfgang; Weise, Hartmut; Pfeiffer, Dorothea; Nunchert, Anette; Schubert, Florian; Meiske, Christoph; and Kuhnel, Siegfried, 4,987,075, Cl. 435-182.000.

Bremers, Alan D.; and Osgood, Melvin L., to Fisher Controls International, Inc. Bonnet nut with improved safety characteristics. 4,986,300, Cl. 137-315.000.

Brennan, Kevin F.: *See*—
Gaylord, Thomas K.; Brennan, Kevin F.; and Glytsis, Elias N., 4,987,458, Cl. 357-4.000.

Breslau, Barry R.; and Slegers, John, to Romicon Inc. Membrane separation system and method of operation. 4,986,918, Cl. 210-652.000.

Bridgestone Corporation: *See*—
Matsumoto, Hiroyuki, 4,986,325, Cl. 152-209.00R.

Brier Technology, Inc.: *See*—
Bizjak, John; Hassel, Michael; and Niemann, David, 4,987,500, Cl. 360-46.000.

Briggs & Stratton Corporation: *See*—
Tharman, Paul A., 4,986,228, Cl. 123-179.0BG.

British Aerospace plc: *See*—
Rennie, Nigel F., 4,986,139, Cl. 74-5.400.

British Aerospace Public Limited Company: *See*—
Salkeld, Geoffrey, 4,987,419, Cl. 342-75.000.

British Gas plc: *See*—
Dickinson, Alan J.; and Stafford, Trevor G., 4,987,018, Cl. 428-36.900.
Parsons, Peter J., 4,986,899, Cl. 208-310.00R.

British Petroleum Company p.l.c., The: *See*—
Sidey, Roger C. H., 4,986,111, Cl. 73-37.500.

Broadwin, Alan; and Emery, Leonard M., to Valleylab, Inc. Magnetostrictive transducer. 4,986,808, Cl. 604-22.000.

Broggi, Fabrizio: *See*—
Li Bassi, Giuseppe; Nicora, Carlo; Broggi, Fabrizio; and Revelli, Aldo, 4,987,159, Cl. 522-36.000.

Broomhall, Keith, to Barrico Limited. Processing crop material. 4,986,747, Cl. 425-519.000.

Brosh, Amnon; and Landmann, Wolf S., to Borg-Warner Automotive, Inc. Lockproof low level oscillator using digital components. 4,987,389, Cl. 331-167.000.

Brosnan, Jeanne M.; and Ault, Kenneth A., to Becton, Dickinson and Company. Method for analysis of subpopulations of cells. 4,987,086, Cl. 436-501.000.

Brother Kogyo Kabushiki Kaisha: *See*—
Kawaura, Masafumi, 4,986,679, Cl. 400-208.000.
Ohta, Mitsuru, 4,986,633, Cl. 350-167.000.
Takagi, Kazuhiko; Sonoda, Rikuo; and Umemura, Kazuo, 4,986,525, Cl. 271-114.000.

Brown, John T.; and Kosco, John, to Corning Incorporated. Wide range oxy-fuel burner and furnace operation. 4,986,748, Cl. 431-188.000.

Brown, Oswald. Outboard motor power takeoff. 4,986,783, Cl. 440-900.000.

Brown, Peter W., to Outboard Marine Corporation. Piston with graphite fiber mesh. 4,986,231, Cl. 123-193.00P.

Brubaker, Inara M.: *See*—
Yates, Stephen F.; Good, Mary L.; and Brubaker, Inara M., 4,986,921, Cl. 210-758.000.

Bruck, Dieter: *See*—
Arlt, Wolfgang; Waniczek, Helmut; Viard, Richard; and Bruck, Dieter, 4,986,884, Cl. 203-8.000.

Bruder, Axel: *See*—
Wagner, Werner; Bruder, Axel; and Giehsler, Kurt, 4,987,029, Cl. 428-319.300.

Brueck, Steven R. J.; Soares, Schubert; McArdle, Kristin; and Mullins, Bill W., to University of New Mexico, The. High position resolution sensor with rectifying contacts. 4,987,461, Cl. 357-19.000.

Brugel, Edward G., to Du Pont de Nemours, E. I., and Company. Stabilization of poly(ether ketone ketones). 4,987,171, Cl. 524-396.000.

Brumley, E. Ray: *See*—
Reneau, Charles F.; and Brumley, E. Ray, 4,986,220, Cl. 119-57.910.

Brunetti, Armando; Johnson, Eric; and Martz, Laura, to Filtra Corporation. Modular support system for a filter-type ceiling grid. 4,986,050, Cl. 52-488.000.

Brunhoefer, Harry C. Layout sheet. 4,986,573, Cl. 283-62.000.

Brunhuber, Egon: *See*—
Freisinger, Henry; Wurther, Hubert; Stritzl, Karl; and Brunhuber, Egon, 4,986,562, Cl. 280-633.000.

Brunner, Wolfgang; and von Zech, Ludwig. Measuring system. 4,986,136, Cl. 73-862.040.

Brunner, Wolfgang; and Zech, Ludwig V. Method of displaying high-resolution distributions of physical parameters on a monitor and device for carrying out the method. 4,987,602, Cl. 382-1.000.

Brunswick Corporation: *See*—
Wantz, David B., 4,986,774, Cl. 440-75.000.
Wantz, David B., 4,986,775, Cl. 440-83.000.

Bruton, William J., to Automotive Systems Laboratory, Inc. Airbag attachment system. 4,986,569, Cl. 280-743.000.

Bruveris, Vilnis: *See*—
Carlsson, Lars C.; and Bruveris, Vilnis, 4,986,058, Cl. 53-563.000.

Bruynesteyn, Albert: *See*—
Hackl, Ralph P.; Wright, Frank R.; and Bruynesteyn, Albert, 4,987,081, Cl. 435-262.000.

Buchler, Johann: *See*—
Kruppa, Steffen; Buchler, Johann; Schmidt, Manfred; and Prescher, Guenter, 4,987,226, Cl. 540-145.000.

Bucholz, Frederick S., to Plastilite Corporation. Line tie. 4,986,023, Cl. 43-44.870.

Buck, David A. Camming member for power tongs. 4,986,146, Cl. 81-57.180.

Buckland, Dennis J., to Grumman Aerospace Corporation. Adaptive referencing analog-to-digital converter. 4,987,417, Cl. 341-159.000.

Buckley, Roy W., to John Heathcoat & Company Limited. Heat resistant synthetic plastics materials. 4,987,015, Cl. 427-389.900.

Budinski, Michael K.: *See*—
Wilde, Bryan E.; and Budinski, Michael K., 4,987,037, Cl. 428-653.000.

Buehning, Peter G., to Accurate Products Co. Melt blowing die. 4,986,743, Cl. 425-7.000.

Bugar, Robert; Chakraborty, Asok; and Urlaub, Herbert, to Schleicher & Schuell GmbH. Color coded disposable filter holder. 4,986,904, Cl. 210-94.000.

Buhrer, Carl F., to GTE Laboratories Incorporated. Optical wavelength multiplexer/demultiplexer and demultiplexer/remultiplexer. 4,987,567, Cl. 370-3.000.

Bulka, Raymond I.; and Higgins, George D., to McCain Manufacturing Corp. Reject device for a signature gathering machine. 4,986,521, Cl. 270-54.000.

Bunnell, Lee R., Sr., to Battelle Memorial Institute. Enhancement of the mechanical properties by graphite flake addition. 4,987,175, Cl. 524-449.000.

Burckhardt, Holger: *See*—
Oppawsky, Steffen; and Burckhardt, Holger, 4,987,310, Cl. 250-492.100.

Bures, Milan, to AMP Incorporated. Touch entry using discrete reflectors. 4,986,662, Cl. 356-375.000.

Burgess, Dennis A.; Campbell, William J.; and Saldenais, Arvids, to Burgess Industries Inc. Scanning light contact duplicating apparatus. 4,987,445, Cl. 355-84.000.

Burgess Industries Inc.: *See*—
Burgess, Dennis A.; Campbell, William J.; and Saldenais, Arvids, 4,987,445, Cl. 355-84.000.

Burgess, Patrick A.: *See*—
Gibbs, Danny R.; Burgess, Patrick A.; Kurklis, William J.; and Harger, Mark A., 4,987,363, Cl. 324-142.000.

Burke, Dennis E. FSK demodulator. 4,987,374, Cl. 329-302.000.

Burke, Ronald D.; and Mattes, Carl J., to International Business Machines Corporation. High level clamp driver for wire-or buses. 4,987,318, Cl. 307-443.000.

Burlington Industries, Inc.: *See*—
Morrison, Elbert F., 4,986,066, Cl. 57-333.000.

Burney, Bryan T.; Griffith, Steven L.; Fry, Francis J.; Jang, Yue-Teh; Thornton, Pamela M.; and Liebmann, Vern L., to Indianapolis Center for Advanced Research. One-punch catheter. 4,986,814, Cl. 604-164.000.

Burns, Charles M.: *See*—
Kirk, Kenneth; Remick, Cassius D.; Burns, Charles M.; and Habicher, Berthold H., 4,986,076, Cl. 62-4.000.

Burns, Marvin D., to DeVilbiss Company, The. In-line pressure gauge. 4,986,128, Cl. 73-744.000.

Burnswick Corporation: *See*—
Hensel, Robert J.; and Staerzl, Richard E., 4,986,776, Cl. 440-87.000.

Burrafato, Giovanni: *See*—
Lockhart, Thomas P.; and Burrafato, Giovanni, 4,986,356, Cl. 166-300.000.

Burrows, Cynthia; Yoon, Heungsik; and Wagler, Thomas R., to Research Foundation of State University of New York, The. Polyazamacrocycles and their metal complexes. 4,987,227, Cl. 540-452.000.

Bushell, Michael J.; Carr, Robin A. E.; Moseley, Donn W.; and Sillars, Nan C., to Imperial Chemical Industries PLC. Insecticidal compounds and compositions. 4,987,141, Cl. 514-346.000.

Butch, Adam F. Solid waste incinerator system. 4,986,196, Cl. 110-235.000.

Butera, William J.: *See*—
Lippman, Andrew B.; and Butera, William J., 4,987,480, Cl. 358-13.000.

Butler, Brent K. Tube sound solid-state amplifier. 4,987,381, Cl. 330-255.000.

Butler Manufacturing Co.: *See*—
Domigan, Charles N.; and Harmon, J. David, 4,986,045, Cl. 52-221.000.

Byrne, John V.; McMullin, Francis; and Murray, Aengus, to Kollmorgen Corporation. Screened inductance sensors, especially sensors for level measurement. 4,986,124, Cl. 73-317.000.

C. Gehrens AG: *See*—
Otto, Gerhard; and Tamaschke, Walter, 4,985,983, Cl. 29-568.000.

Caccialupi, Gianfranco. Process for the production of chains and other ornamental items made of a lined tube bar and of similar objects. 4,986,067, Cl. 59-3.000.

Cadee, Theodorus P. M.: *See*—
Van Rooij, Jacobus H. M.; and Cadee, Theodorus P. M., 4,986,798, Cl. 474-214.000.

Cady, Edwin C.: *See*—
Blackmon, James B.; Cady, Edwin C.; and Jones, Nelson E., 4,986,346, Cl. 165-86.000.

Cahill, Michael J.; Dawson, John; and Warner, Brian H., to Molins PLC. Cigarette manufacture. 4,986,284, Cl. 131-88.000.

Calderazzo, Fausto; Pampaloni, Guido; Masi, Francesco; Moalli, Angelo; and Invernizzi, Renzo, to Enichem Anic, S.p.A. Catalyst component and catalyst for the polymerization of ethylene and the copolymerization of ethylene with alpha-olefins. 4,987,111, Cl. 502-113.000.

Call, Laurence W.: *See*—
Achgill, Ralph K.; and Call, Laurence W., 4,987,233, Cl. 548-140.000.

Calomino, Anthony M., to United States of America as represented by the Administrator of the National Aeronautics and Space Administration, The. Fully articulated four-point-bend loading fixture. 4,986,132, Cl. 73-852.000.

Camco International Inc.: *See*—
Lueders, Edgar D.; and Roth, Brian A., 4,986,358, Cl. 166-321.000.

Camp International, Inc.: *See*—
Meier, Robert H.; Seel, Jerry E.; and Gray, Gary W., 4,986,534, Cl. 272-96.000.

Campagnoli, Susanna: *See*—
Grandi, Guido; Mele, Antonio; Colletti, Elisabetta; Campagnoli, Susanna; and Nogarotto, Renzo, 4,987,078, Cl. 435-231.000.

Campbell, Andrew B.; and Simon, Ira J., to Triangle Brass Manufacturing Company. Door-latch opener. 4,986,583, Cl. 292-336.300.

Campbell, Ernest J., to American Standard Inc. Adjustable air brake hose support for railway vehicles. 4,986,500, Cl. 248-53.000.

Campbell, Jeffrey L.: *See*—
Warlick, Timothy A.; Campbell, Jeffrey L.; Peters, Lester L.; Lucas, Michael E.; Perr, Julius P.; and Wan, Kuang-Wen T., 4,986,472, Cl. 239-88.000.

Campbell, Melvin L.: *See*—
Bishop, Gary D.; Campbell, Melvin L.; and Shaw, James E., 4,987,289, Cl. 219-209.000.

Campbell, William J.: *See*—
Burgess, Dennis A.; Campbell, William J.; and Saldenais, Arvids, 4,987,445, Cl. 355-84.000.

Canada, Atomic Energy of, Ltd.: *See*—
Hopkins, James R.; and Strachan, Brian, 4,986,112, Cl. 73-49.200.

Candela Laser Corporation: *See*—
Cho, George E.; and Furumoto, Horace, 4,986,258, Cl. 128-7.000.

Canfield, Barth A.; Fling, Russell T.; and Willis, Donald H., to RCA Licensing Corporation. Memory efficient interlace apparatus and method as for a picture in a picture display. 4,987,493, Cl. 358-183.000.

Cannon, Fleming V., Jr.: *See*—
Holmes, Gerald E.; and Cannon, Fleming V., Jr., 4,986,720, Cl. 414-563.000.

Canon Kabushiki Kaisha: *See*—
Arai, Hitoshi, 4,987,495, Cl. 358-448.000.
Hori, Taizou, 4,987,501, Cl. 360-64.000.
Ikeda, Yoshinori; Yoshida, Tadashi; Hayashi, Kimiyoshi; Abe, Shunichi; Matsuoka, Nobuo; Akiyama, Mitsuo; and Mita, Yoshinobu, 4,987,484, Cl. 358-75.000.
Imai, Kunio; Homma, Hideo; and Hieda, Teruo, 4,987,482, Cl. 358-41.000.
Iwata, Kazuo; Tochihara, Shinichi; and Koike, Shoji, 4,986,850, Cl. 106-25.000.
Kondo, Hiroatsu; Yoshikawa, Junichi; and Kawanabe, Tetsuya, 4,986,677, Cl. 400-187.000.
Ohe, Shinichi, 4,986,657, Cl. 356-73.000.
Ota, Shinichi; and Kawasaki, Keiichi, 4,987,426, Cl. 346-108.000.
Shido, Hironori; Saito, Jun; Hiroi, Masakazu; Kobayashi, Kenji; Murakami, Koichi; Naito, Masataka; and Honjo, Takeshi, 4,986,520, Cl. 270-53.000.
Takasu, Katsuji; Sano, Masafumi; Tsuda, Hisanori; and Hirai, Yutaka, 4,987,460, Cl. 357-17.000.

Cantatore, Giuseppe; and Borzatta, Valerio, to Ciba-Geigy Corporation. Polytriazine compounds containing recurring piperidylamidinotriazine structural units and their use as stabilizers for organic materials. 4,987,228, Cl. 544-198.000.

Cantu, Lisa A.; and Yost, Marvin E., to Conoco Inc.; and Du Pont de Nemours, E. I., and Company. Composition and placement process for oil field chemicals. 4,986,354, Cl. 166-279.000.

Cantu, Lisa A.: *See*—
Casad, Burton M.; Clark, Charles R.; Cantu, Lisa A.; Cords, D. Philip; and McBride, Edward F., 4,986,355, Cl. 166-295.000.

Canzoneri, Anthony S.; and Boze, Ronald A. Induced static single flotation cell. 4,986,903, Cl. 210-90.000.

Capital Controls Company, Inc.: *See*—
Jones, Walton B.; and Elterich, Richard C., 4,986,296, Cl. 137-3.000.

Caponi, Ronald E. Protective cover for cast. 4,986,265, Cl. 128-82.000.

Caporusso, Alessandro; and Caporusso, Mario. Portable pipe-binding minimachine. 4,986,104, Cl. 72-158.000.

Caporusso, Mario: *See*—
Caporusso, Alessandro; and Caporusso, Mario, 4,986,104, Cl. 72-158.000.

Cargill, Incorporated: *See*—
Chanen, Michael J., 4,986,993, Cl. 426-93.000.

Cargill UL Limited: *See*—
Wilde, Geoffrey, 4,986,108, Cl. 73-1.00R.

Carl Schenck AG: *See*—
Storck, Karlheinz, 4,986,795, Cl. 474-91.000.

Carlson, Ted: *See*—
Akkas, Tamer; and Carlson, Ted, 4,986,827, Cl. 606-107.000.

Carlsson, Hans: *See*—
Jacobsson, Kent; and Carlsson, Hans, 4,986,465, Cl. 229-123.300.

Carlsson, Lars C.; and Bruveris, Vilnis, to AB Tetra Pak. Pressure application arrangement on a packing machine. 4,986,058, Cl. 53-563.000.

Carmel, Edwin L.; DeRegnaucourt, Robert A.; and Reichel, Lee, to Dayton-Walther Corporation. System for final balancing of cast metal brake drums. 4,986,149, Cl. 82-1.110.

Carnick, Robert C.: *See*—
Mozuras, Gary; Perliski, Dennis; and Carnick, Robert C., 4,986,034, Cl. 49-505.000.

Carr, Marcus E., Jr.; and Zekert, Sheryl L., to Center for Innovative Technology; and Virginia Commonwealth University. Clot retractometer. 4,986,964, Cl. 422-73.000.

Carr, Robin A. E.: *See*—
Bushell, Michael J.; Carr, Robin A. E.; Moseley, Donn W.; and Sillars, Nan C., 4,987,141, Cl. 514-346.000.

Carre, Patrick: *See*—
Imbert, Claude; Jouet, Jean M.; and Carre, Patrick, 4,986,818, Cl. 604-192.000.

Carrier Corporation: *See*—
Beckhusen, Gerard F., 4,986,084, Cl. 62-197.000.

Carter, Daniel L.: *See*—
Zoltner, John D.; Carter, Daniel L.; Lipani, Anthony F.; and Gardner, John F., 4,986,713, Cl. 412-34.000.

Carter, Daniel S.: *See*—
Hieb, Larry E.; Petrie, Gregory A.; and Carter, Daniel S., 4,986,615, Cl. 312-45.000.

Carter, David C. M.; Dunckley, Ian; and Lait, Leonard G., to Molins plc. Apparatus for handling rod-like articles. 4,986,408, Cl. 198-368.000.

Cartier International B.V.: *See*—
Mourgue, Pascal; and Hardy, Patrice, 4,986,202, Cl. 114-39.100.

Cartner, Jack O. Sloper apparatus. 4,986,010, Cl. 37-108.00R.

Casad, Burton M.; Clark, Charles R.; Cantu, Lisa A.; Cords, D. Philip; and McBride, Edward F., to Conoco Inc. Process for the preparation of fluid loss additive and gel breaker. 4,986,355, Cl. 166-295.000.

Casagrande SpA: *See*—
Coccolo, Enzo, 4,986,484, Cl. 242-47.010.

Casey, Jon A.: *See*—
Araps, Constance J.; Casey, Jon A.; Divakaruni, Renuka S.; Kandetzke, Steven M.; and Lotsko, Catherine A., 4,987,211, Cl. 526-251.000.

Casey, Leo: *See*—
Ofori-Tenkorang, John; Otten, David; and Casey, Leo, 4,987,372, Cl. 324-705.000.

Casio Computer Co., Ltd.: *See*—
Matsubara, Akinori, 4,986,157, Cl. 84-646.000.

Cassella Aktiengesellschaft: *See*—
Schonafinger, Karl; Beyerle, Rudi; Schindler, Ursula; Jablonka, Bernd; and Troke, Jeffery, 4,987,134, Cl. 514-252.000.

Cassidy, Frederick; and Stemp, Geoffrey, to Beecham Group p.l.c. Active compounds. 4,987,138, Cl. 514-320.000.

Cassone, Rudolph. Canine lavatory. 4,986,218, Cl. 119-169.000.

Catalysts & Chemicals Industries Co., Ltd.: *See*—
Sato, Goro; Komatsu, Michio; Nishida, Hiroyasu; Tanaka, Yoshichika; Koyanagi, Tsuguo; and Mihara, Kei-ichi, 4,987,012, Cl. 427-221.000.

Caterpillar Inc.: *See*—
Stratton, Michael; and Jeske, Clifford O., 4,986,167, Cl. 92-186.000.

Cavioni, Tiziana: *See*—
Bergonzoni, Carlo; Cavioni, Tiziana; and Crisenza, Giuseppe P., 4,987,088, Cl. 437-34.000.

Cebora S.p.A.: *See*—
Dallavalle, Silvano; and Ansaloni, Raffaele, 4,987,285, Cl. 219-121.540.

Cecchi, Stefano; and Simonelli, Francesco, to Societa' Cavi Pirelli S.p.A. Method and apparatus for determining the position of a mobile body. 4,986,663, Cl. 356-375.000.

Cech, Thomas R.; Zaug, Arthur J.; and Been, Michael D., to University Patents, Inc. RNA ribozyme polymerases, dephosphorylases, restriction endoribonucleases and methods. 4,987,071, Cl. 435-91.000.

Center for Innovative Technology: *See*—
Baertschi, Alex J.; and Niskanen, Eero, 4,987,121, Cl. 514-8.000.
Carr, Marcus E., Jr.; and Zekert, Sheryl L., 4,986,964, Cl. 422-73.000.

Central Glass Company, Limited: *See*—
Kandachi, Takayoshi; and Nakamura, Nobuo, 4,987,028, Cl. 428-312.600.
Maruta, Masamichi; Kaneda, Showzou; Watanabe, Mineo; and Katoh, Etsuko, 4,987,259, Cl. 564-335.000.
Centre d'Etude des Materiaux Organiques pour Technologies Avances (Cemota): *See*—
Malinge, Jean; Rabilloud, Guy; and Sillion, Bernard, 4,987,218, Cl. 528-353.000.
Centre National D'Etudes Spatiales (C.N.E.S.): *See*—
Tockert, Christian, 4,986,494, Cl. 244-96.000.
Century Products Company: *See*—
Wise, Robert D., 4,986,599, Cl. 297-183.000.
Century Wrecker Corporation: *See*—
Holmes, Gerald E.; and Cannon, Fleming V., Jr., 4,986,720, Cl. 414-563.000.
Cereberus Guinard: *See*—
Nahmiaj, Jean, 4,986,363, Cl. 169-46.000.
Ceroke, Clarence J. Safety drain plug. 4,986,502, Cl. 251-216.000.
Cerulla, Frederick A. Horse racing board game. 4,986,546, Cl. 273-240.000.
Cesari, Marco; Roggero, Arnaldo; Rivola, Luigi; and Demertzis, Yean, to Eniricerche, S.p.A. Inhibitors of corrosion in high-strength and medium-strength steels. 4,986,962, Cl. 422-7.000.
Chakraborty, Asok: *See*—
Bugar, Robert; Chakraborty, Asok; and Urlaub, Herbert, 4,986,904, Cl. 210-94.000.
Champseaux, Serge, to ABX. Switching microelectrovalve having a single membrane. 4,986,308, Cl. 137-625.440.
Chan, chi-Cheung: *See*—
Wei, Yen; Jang, Guang-Way; and Chan, chi-Cheung, 4,986,886, Cl. 204-78.000.
Chandler, Michael E.: *See*—
Meintzer, John C., Jr.; and Chandler, Michael E., 4,986,524, Cl. 271-100.000.
Chanen, Michael J., to Cargill, Incorporated. Composition and method for conditioning grain. 4,986,993, Cl. 426-93.000.
Chang, David B.; and Pierce, Brian M., to Hughes Aircraft Company. Eye protection device against broadband high intensity light. 4,986,639, Cl. 350-354.000.
Chang, David B.: *See*—
Webster, Jackie R.; Pearson, Keith V.; Chang, David B.; Moise, Norton L.; and Vali, Victor, 4,987,582, Cl. 378-85.000.
Chang, Kuang-Yeh: *See*—
Longcor, Steven W.; Chang, Kuang-Yeh; Lien, Jih-Chang; and Rogers, David M., 4,987,465, Cl. 357-23.130.
Chang, Robert H.; and Hayman, Peter A., to RC International, Inc. Wire drop keyboard drawer. 4,986,616, Cl. 312-208.000.
Chang, Tiang-shing; and Marchese, Lisa N. W., to Block Drug Co., Inc. Thermoplastic and injectable endodontic filling compositions. 4,986,754, Cl. 433-224.000.
Charamathieu, Andre ; Gouaillardou, Gerard; and Cizel, Jean-Pierre, to Societe des techniques en Milieu Ionisant STMI. Suction cup for the electrolytic treatment of a surface. 4,986,889, Cl. 204-279.000.
Charland, Guy; and Beaudoin, Robert, to Les Industries L.T.A. Inc./L.T.A. Industries Inc. Post hole digger. 4,986,373, Cl. 175-21.000.
Charlton, Scott: *See*—
Dickerson, Jeffrey P.; and Charlton, Scott, 4,986,263, Cl. 128-80.00C.
Charnley, Anthony K.; Cooper, Richard M.; and St. Leger, Raymond J., to Agricultural Genetics Company Limited. Preparations of protease enzymes derived from entomopathogenic fungi. 4,987,077, Cl. 435-223.000.
Chastain, William P., to K-2 Corporation. Snow ski with treated metal edge. 4,987,282, Cl. 219-76.140.
Chaum, David. One-show blind signature systems. 4,987,593, Cl. 380-3.000.
Chauvet, Ludovic: *See*—
Bellamy, Alain; and Chauvet, Ludovic, 4,986,510, Cl. 248-562.000.
Chebyshev, Alexei E.: *See*—
Mogilevsky, Ilya M.; Vengerov, Igor A.; Gusar, Alexandr G.; Makarov, onstantin A.; and Chebyshev, Alexei E., 4,986,652, Cl. 356-2.000.
Cheil Sugar & Co., Ltd.: *See*—
Han, Yong N.; Han, Byung H.; Baik, Soung K.; and Kim, Tae H., 4,987,125, Cl. 514-33.000.
Chemtrak Inc.: *See*—
Allen, Michael P.; Ramel, Urs A.; and DeLizza, Anthony J., 4,987,085, Cl. 436-169.000.
Chen, Chen-Hsiung. Violin musical toy. 4,986,792, Cl. 446-408.000.
Chen, Chi-Wan: *See*—
Cohen, Jack S.; Chen, Chi-Wan; Myers, Charles E.; and Sohn, Miriam, 4,986,256, Cl. 128-653.400.
Chen, Ming-Hsiung. Vehicular internal fan ventilator. 4,986,169, Cl. 98-2.020.
Chen, Shieh-Shung T.; Wicker, Linda S.; and Arison, Byron H., to Merck & Co., Inc. FK-520 microbial transformation product. 4,987,139, Cl. 514-321.000.
Chen, Timothy S.: *See*—
Riccitiello, Salvatore R.; Hsu, Ming-ta S.; and Chen, Timothy S., 4,987,201, Cl. 528-4.000.
Chervonenko, Alfred G.: *See*—
Poturaev, Valentin N.; Chervonenko, Alfred G.; Morus, Vladimir L.; and Lavrukhin, Viktor A., 4,986,422, Cl. 209-326.000.
Chiang, Arthur. Free positioning tilt unit. 4,986,507, Cl. 248-291.000.
Chibret, Jean; and Manni, Charles, to Societe Semco. System of packaging for ready to use preparations. 4,986,322, Cl. 141-319.000.
Chikama, Atsushi, to Asahi Kogaku Kogyo Kabushiki Kaisha. Skewing detection mechanism for printer employing continuous recording form. 4,987,448, Cl. 355-205.000.
Chikama, Toshio, to Kabushiki Kaisha Machida Seisakusho. Bending device. 4,986,257, Cl. 128-4.000.
Chikano, Takahide: *See*—
Takashio, Masachika; Chikano, Takahide; and Kamimura, Minoru, 4,987,076, Cl. 435-191.000.
Child, Robin E., to Concentric Pumps Limited. Gerotor pump having axial fluid transfer passages through the lobes. 4,986,739, Cl. 418-15.000.
Chin, Arthur A., to Mobil Oil Corporation. Catalytic conversion of NO_x with NH_3. 4,986,897, Cl. 208-113.000.
Chin, Arthur A.: *See*—
Avidan, Amos A.; and Chin, Arthur A., 4,986,896, Cl. 208-52.0CT.
Chin, Arthur H. T., to Cooper Industries, Inc. Subsea pipeline method and apparatus. 4,986,698, Cl. 405-169.000.
Chinomi, Isamu: *See*—
Suzuki, Takami; Chinomi, Isamu; Tanaka, Yuji; and Kuwabara, Isao, 4,986,509, Cl. 248-396.000.
Chisso Corporation: *See*—
Saho, Takahiro; Akutsu, Yoshinori; Nakano, Takaharu; and Ohtake, Nobumasa, 4,987,203, Cl. 528-27.000.
Cho, George E.; and Furumoto, Horace, to Candela Laser Corporation. Endoscope with tapered shaft. 4,986,258, Cl. 128-7.000.
Choay, Jean; Jacquinet, Jean-Claude; Petitou, Maurice; and Sinay, Pierre, to Choay S.A. Derivatives of the uronic acid. 4,987,223, Cl. 536-17.700.
Choay S.A.: *See*—
Choay, Jean; Jacquinet, Jean-Claude; Petitou, Maurice; and Sinay, Pierre, 4,987,223, Cl. 536-17.700.
Chopra, Vinod K.: *See*—
Travanty, Frank C.; Allen, Philip M.; and Chopra, Vinod K., 4,987,583, Cl. 378-91.000.
Chou, Chao-Jen; and Wang, Teng-Yun. Retractable lock structure. 4,986,095, Cl. 70-18.000.
Christopher, Neil B.: *See*—
Cole, Joe S.; and Christopher, Neil B., 4,986,609, Cl. 303-9.690.
Chrontel, Inc.: *See*—
Soo, David C., 4,987,373, Cl. 328-155.000.
Chrysler Corporation: *See*—
Mehta, Hemang S., 4,986,145, Cl. 74-843.000.
Quinting, Franz R., 4,986,570, Cl. 280-808.000.
Chu, Chaokang: *See*—
Rai, Vish; Dailey, Nils; Southall, Kenneth; Webster, Timothy; Leeke, Gordon; and Chu, Chaokang, 4,986,909, Cl. 210-198.300.
Chu, Chung K., to University of Georgia Research Foundation, Inc. Method of preparation of 2',3'-dideoxynucleosides. 4,987,224, Cl. 536-23.000.
Chuang, Rong-Chao. Valve of direct passage type which is responsive to fluid pressure. 4,986,302, Cl. 137-495.000.
Chun Zu Machinery Industry Co., Ltd.: *See*—
Wang, Sheng-Yau, 4,985,981, Cl. 29-563.000.
Churchill, Philip: *See*—
Marcus, Beth; Lawrence, W. Thompson; and Churchill, Philip, 4,986,280, Cl. 128-774.000.
Ciba-Geigy Corporation: *See*—
Bohlendorf, Bettina; Bedorf, Norbert; Hofle, Gerhard; Schummer, Dietmar; and Sutter, Marius, 4,987,149, Cl. 514-450.000.
Cantatore, Giuseppe; and Borzatta, Valerio, 4,987,228, Cl. 544-198.000.
Cilia, Giuseppe: *See*—
Rizzo, Giorgio; Cilia, Giuseppe; and Gadda, Cesare, 4,987,307, Cl. 250-368.000.
Cinader, Gideon: *See*—
Bornstein, Aharon; and Cinader, Gideon, 4,987,305, Cl. 250-352.000.
Cincinnati Milacron Inc.: *See*—
Steinmetz, Michael A.; and Lintner, David E., 4,986,724, Cl. 414-729.000.
Cinq-Mars, Pierre: *See*—
Schuster, David M.; Fisher, Harvey; Cinq-Mars, Pierre; and Altshuller, Bernard, 4,987,003, Cl. 427-37.000.
Citizen Watch Co., Ltd.: *See*—
Moriya, Takashi; Ueda, Masahiko; and Endo, Toshihiro, 4,986,179, Cl. 101-93.040.
Cizel, Jean-Pierre: *See*—
Charamathieu, Andre ; Gouaillardou, Gerard; and Cizel, Jean-Pierre, 4,986,889, Cl. 204-279.000.
Claber S.p.A.: *See*—
Roman, Gianfranco, 4,986,477, Cl. 239-455.000.
Clarisse, Christian; Le Contellec, Michel; and Riou, Marie-Therese. Organic semiconductor device based on phthalocyanine. 4,987,430, Cl. 357-8.000.
Clark, Charles R.; Whitfill, Donald L.; Cords, D. Philip; McBride, Edward F.; and Bellis, Harold E., to Conoco Inc.; and Du Pont de Nemours, E. I., and Company. Placement process for oil field chemicals. 4,986,353, Cl. 166-279.000.
Clark, Charles R.: *See*—
Casad, Burton M.; Clark, Charles R.; Cantu, Lisa A.; Cords, D. Philip; and McBride, Edward F., 4,986,355, Cl. 166-295.000.
Clark, Connie M.; Harding, Warren B.; and Tang, Horace T. S., to International Business Machines Corporation. Method of managing data in a data storage hierarchy and a data storage hierarchy therefor

with removal of the least recently mounted medium. 4,987,533, Cl. 364-200.000.
Clark, Edward T.; and Ferrer, Enrique, to Motorola, Inc. Gallium arsenide antenna switch. 4,987,392, Cl. 333-103.000.
Clark, Thomas W. Dual purpose fire fighting and ventilation apparatus. 4,986,364, Cl. 169-48.000.
Claus, Dieter: *See*—
Lohr, Hans-Gunter; Herrmann, Gunter; Mozzi, Josef W.; and Claus, Dieter, 4,985,982, Cl. 29-566.001.
Clausen, Edvin L., to Norsk Hydro A.S. Vehicle space frame and a method for manufacturing of vehicle space frame parts. 4,986,597, Cl. 296-205.000.
Clear & Pure, Inc.: *See*—
Dadisman, Joseph T., 4,986,906, Cl. 210-169.000.
Clemence, Francois; Le Martret, Odile; and Delevallee, Francois, to Roussel Uclaf. 4H-triazolo[4,3-a][1,4]benzodiazepines. 4,987,131, Cl. 514-220.000.
Clemence, Francois; Le Martret, Odile; and Delevallee, Francoise, to Roussel Uclaf. Pyridines. 4,987,140, Cl. 514-335.000.
Cloutier, Robert P., to Eastman Kodak Company. Sensing magnetic recording on film of series scence indication an use thereof in a photofinishing system. 4,987,439, Cl. 355-40.000.
Coccolo, Enzo, to Casagrande SpA. Method to store filiform products and relative device to store filiform products. 4,986,484, Cl. 242-47.010.
Code, James, to International Development Systems, Inc. Hypodermic syringe sheath holder and needle guide. 4,986,817, Cl. 604-192.000.
Codex Corporation: *See*—
Humblet, Pierre A., 4,987,536, Cl. 364-200.000.
Ling, Fuyun; and Long, Guozhu, 4,987,569, Cl. 370-32.100.
Coffin, Dave, to Wilkinson Sword Gesellschaft mit beschrankter Haftung. Razor head, especially a razor blade unit. 4,985,995, Cl. 30-84.000.
Cogema: *See*—
Bernard, Gebelin, 4,986,953, Cl. 376-245.000.
Guironnet, Louis; and Bline, Michel, 4,986,955, Cl. 376-261.000.
Cohen, Jack S.; Chen, Chi-Wan; Myers, Charles E.; and Sohn, Miriam, to United States of America, Health and Human Services. Use of paramagnetic metalloporphyrins as contrast agents for tumors in MRI imaging. 4,986,256, Cl. 128-653.400.
Cohen, Todd J., to Bloom, Leonard, a part interest. Hemodynamically responsive system for and method of treating a malfunctioning heart. 4,986,270, Cl. 128-419.00D.
Colas, Etienne G.; and Cox, Herbert M., to Bell Communications Research, Inc. Method of making a macroscopic stepped structure on a vicinally cut crystal. 4,987,094, Cl. 437-81.000.
Colby, Donald S., to Continental Can Company, Inc. Box and blank for forming same. 4,986,466, Cl. 229-193.000.
Cole, Joe S.; and Christopher, Neil B., to Surfaces, Inc. Load sensing proportioning valve for brake system. 4,986,609, Cl. 303-9.690.
Colgate-Palmolive Company: *See*—
Kent, Steven; Downie, Sheila; and Slater, Paul, 4,986,288, Cl. 132-321.000.
Collett, Michael F.; and Rankin, Peggy J., to Bonneville International Corporation. Packaging for point of sale display, shipment and storage of cassette recordings and methods. 4,986,419, Cl. 206-387.000.
Colletti, Elisabetta: *See*—
Grandi, Guido; Mele, Antonio; Colletti, Elisabetta; Campagnoli, Susanna; and Nogarotto, Renzo, 4,987,078, Cl. 435-231.000.
Collins, Carl B.: *See*—
Wagal, Suhas S.; and Collins, Carl B., 4,987,007, Cl. 427-53.100.
Colombie, Francis J.: *See*—
Pournain, Michel A.; Loncle, Jean-Pierre A.; and Colombie, Francis J., 4,987,317, Cl. 307-40.000.
Columbia University in the City of New York, The Trustees of: *See*—
Tabas, Ira A., 4,987,151, Cl. 514-548.000.
COM-PRO Systems, Inc.: *See*—
Susko, Kenneth A., 4,986,497, Cl. 244-134.00C.
Commonwealth Scientific & Industrial Research Organization: *See*—
Trigg, Mark B., 4,987,104, Cl. 501-92.000.
Communications Satellite Corporation: *See*—
Poklemba, John J.; and Thomas, James R., 4,987,386, Cl. 331-10.000.
Compagnie Generale de Geophysique: *See*—
Czernichow, Jean, 4,986,350, Cl. 166-65.100.
Compaq Computer Corporation: *See*—
Gross, Allen E.; and Malm, Marvin F., 4,987,586, Cl. 379-93.000.
Compton, Ira. Agricultural harvester. 4,986,065, Cl. 56-340.100.
Computerized Tank Testing, Inc.: *See*—
Harrison, John M.; Marshburn, Hubert L.; and Stout, Ron, deceased, 4,986,113, Cl. 73-49.200.
Concentric Pumps Limited: *See*—
Child, Robin E., 4,986,739, Cl. 418-15.000.
Concept, Inc.: *See*—
Bays, F. Barry; and Trott, Arthur F., 4,986,825, Cl. 604-22.000.
Cone, Richard E., to NCR Corporation. Weigh plate quick release mount. 4,986,376, Cl. 177-128.000.
Conner, Dock L. Body ball tag game. 4,986,548, Cl. 273-346.000.
Conoco Inc.: *See*—
Bell, David W., 4,987,561, Cl. 367-53.000.
Cantu, Lisa A.; and Yost, Marvin E., 4,986,354, Cl. 166-279.000.
Casad, Burton M.; Clark, Charles R.; Cantu, Lisa A.; Cords, D. Philip; and McBride, Edward F., 4,986,355, Cl. 166-295.000.
Clark, Charles R.; Whitfill, Donald L.; Cords, D. Philip; McBride, Edward F.; and Bellis, Harold E., 4,986,353, Cl. 166-279.000.
Conrad, John C.: *See*—
Zeto, Robert J.; Hryckowian, Eugene, deceased; Morton, David C.; Costello, John A.; and Conrad, John C., 4,986,876, Cl. 156-643.000.
Consiglio Nazionale Delle Ricerche: *See*—
Ruso, Saverio; Alfonso, Giovanni C.; Pedemonte, Enrico; Turturro, Antonio; and Martuscelli, Ezio, 4,987,189, Cl. 525-183.000.
Continental Can Company, Inc.: *See*—
Colby, Donald S., 4,986,466, Cl. 229-193.000.
Continental Plastics, Inc.: *See*—
Dutt, Herbert V., 4,986,430, Cl. 215-253.000.
Control Devices, Inc.: *See*—
Ross, Paul F., II, 4,986,297, Cl. 137-15.000.
Contzen, Franz-Peter; and Wilmers, Katrin, to Leybold AG. Viewing glass for vacuum apparatus. 4,986,636, Cl. 350-319.000.
Convault Inc.: *See*—
Bambacigno, Ralph; and Lindquist, Thomas R., 4,986,436, Cl. 220-86.00R.
Cooksey, Andrew G., to Otis Engineering Corp. Connector assembly for wireline tool string. 4,986,690, Cl. 403-319.000.
Cooper, David E.: *See*—
Johnson, Michael F.; Roberts, Lyn M.; and Cooper, David E., 4,986,099, Cl. 70-277.000.
Cooper, Gerald C., to National Hand Tool Corporation. Ratchet wrench having an internally reinforced handle. 4,986,147, Cl. 81-63.200.
Cooper Industries, Inc.: *See*—
Chin, Arthur H. T., 4,986,698, Cl. 405-169.000.
Hopkinson, Philip J.; and Mayall, George W., 4,987,511, Cl. 361-35.000.
Cooper, Richard M.: *See*—
Charnley, Anthony K.; Cooper, Richard M.; and St. Leger, Raymond J., 4,987,077, Cl. 435-223.000.
Coors BioTech, Inc.: *See*—
Speights, Robert M.; Perna, Peter J.; and Downing, Steven L., 4,987,124, Cl. 514-23.000.
Copal Company Limited: *See*—
Touma, Kiyoshi; and Shimamura, Takashi, 4,987,435, Cl. 354-195.110.
Copco Door Company: *See*—
Mozuras, Gary; Perliski, Dennis; and Carnick, Robert C., 4,986,034, Cl. 49-505.000.
Corbett, James O., to Electron Machine Corporation, The. Stock consistency transmitter. 4,986,660, Cl. 356-342.000.
Corcoran, Richard A.; and Whinston, James P. Method of disinfecting contact lenses with peracetic acid. 4,986,963, Cl. 422-30.000.
Cordier, Georges, to Rhone-Poulenc Chimie. Preparation of 2-methylpentadiamine. 4,987,263, Cl. 564-491.000.
Cords, D. Philip: *See*—
Casad, Burton M.; Clark, Charles R.; Cantu, Lisa A.; Cords, D. Philip; and McBride, Edward F., 4,986,355, Cl. 166-295.000.
Clark, Charles R.; Whitfill, Donald L.; Cords, D. Philip; McBride, Edward F.; and Bellis, Harold E., 4,986,353, Cl. 166-279.000.
Core, Ronald S.: *See*—
Marino, Joseph T., Jr.; and Core, Ronald S., 4,987,595, Cl. 380-50.000.
Corning Incorporated: *See*—
Brown, John T.; and Kosco, John, 4,986,748, Cl. 431-188.000.
Corser, George A.; Hammond, Gary C.; and Eddy, Dale P., to GMI Engineering & Management Institute. Apparatus and method for measuring fluid flow and density. 4,986,135, Cl. 73-861.420.
Corso, Dominique. Guns intended for extruding pastry products. 4,986,444, Cl. 222-23.000.
Costello, John A.: *See*—
Zeto, Robert J.; Hryckowian, Eugene, deceased; Morton, David C.; Costello, John A.; and Conrad, John C., 4,986,876, Cl. 156-643.000.
Costin, C. Richard; and Bailey, Michael A., to Sartomer Company, Inc. Curing process for the manufacture of thermoplastic elastomer binders. 4,986,940, Cl. 264-3.100.
Cotteret, Jean: *See*—
Grollier, Jean F.; Cotteret, Jean; and Garoche, Didier, 4,985,955, Cl. 8-406.000.
Coulter, Joseph R., Jr.; and Matkan, Josef, to Coulter Systems Corporation. Toning method and member for electrostatography. 4,986,211, Cl. 118-644.000.
Coulter Systems Corporation: *See*—
Coulter, Joseph R., Jr.; and Matkan, Josef, 4,986,211, Cl. 118-644.000.
Cox, Herbert M.: *See*—
Colas, Etienne G.; and Cox, Herbert M., 4,987,094, Cl. 437-81.000.
Craft, Thomas W.; Herrin, Bradley T.; and Ludwig, Thomas E., to AST Research, Inc. Shared memory bus system for arbitrating access control among contending memory refresh circuits, peripheral controllers, and bus masters. 4,987,529, Cl. 364-200.000.
Crary Company: *See*—
Majkrzak, David S., 4,986,012, Cl. 37-248.000.
Creasy, Walter S., to Hydromer, Inc. Hydrophilic polyvinybutyral alloys. 4,987,182, Cl. 525-57.000.
Crisenza, Giuseppe P.: *See*—
Bergonzoni, Carlo; Cavioni, Tiziana; and Crisenza, Giuseppe P., 4,987,088, Cl. 437-34.000.
Cromar, Stephen A.; and Reilly, Gavin T., to Vetco Gray Inc. Release apparatus and method for threaded conductor pipe. 4,986,359, Cl. 166-340.000.

Cromer, Paul: *See*—
Braedle, Gilbert; Cromer, Paul; and Huck, Francis, 4,986,806, Cl. 493-468.000.

Cronin, John E.; Kaanta, Carter W.; and Leach, Michael A., to International Business Machines Corporation. Method of forming conductors within an insulating substrate. 4,985,990, Cl. 29-852.000.

Crosby, Robert J.: *See*—
Goron, John; Renza, Ronald G.; Crosby, Robert J.; and Sodtalbers, Erich W., 4,986,911, Cl. 210-396.000.

Crossman, Russell J.: *See*—
Ashley, Charles R.; Crossman, Russell J.; Hennessy, John P.; and Lahm, William J., 4,986,414, Cl. 206-5.100.

Crown Cork & Seal Company, Inc.: *See*—
Yun, Chung J., 4,986,318, Cl. 141-39.000.

Crutcher, John P., to Senco Products, Inc. Pneumatic gun having improved firing valve. 4,986,164, Cl. 91-461.000.

Cullor, Gary W.: *See*—
Cullor, James S., 4,987,079, Cl. 435-240.200.

Cullor, James: *See*—
Cullor, James S., 4,987,079, Cl. 435-240.200.

Cullor, James S., to Smith, Wilbur D.; Cullor, James; Cullor, James S.; and Cullor, Gary W. Composition and method for in vitro cell culture. 4,987,079, Cl. 435-240.200.

Cummins Engine Company, Inc.: *See*—
Warlick, Timothy A.; Campbell, Jeffrey L.; Peters, Lester L.; Lucas, Michael E.; Perr, Julius P.; and Wan, Kuang-Wen T., 4,986,472, Cl. 239-88.000.

Cummins, Samuel P.; and Yakima, Theodore M., to Algra Inc. Drum evacuator apparatus. 4,986,717, Cl. 414-417.000.

Cuno Incorporated: *See*—
Rai, Vish; Dailey, Nils; Southall, Kenneth; Webster, Timothy; Leeke, Gordon; and Chu, Chaokang, 4,986,909, Cl. 210-198.300.

Cur, Nihat O.: *See*—
Pastryk, Jim J.; Cur, Nihat O.; Hardaway, Anthony H.; and Euler, John W., 4,986,093, Cl. 68-13.00R.

Cushion Cut, Inc.: *See*—
Holmes, William K.; and Joneikis, Albert E., 4,986,252, Cl. 125-21.000.

Cypress Semiconductor Corp.: *See*—
Malazgirt, Alp; Padmakumar, Bala; and Bhattacherjee, Arya, 4,986,878, Cl. 156-643.000.

Czernichow, Jean, to Institut Francais du Petrole; Total Compagnie Francais des Petroles; Compagnie Generale de Geophysique; Service Nationale Dit: Gaz de France; and Societe Nationale Elf Aquitaine. Device for the seismic monitoring of an underground deposit. 4,986,350, Cl. 166-65.100.

Dadisman, Joseph T., to Clear & Pure, Inc. Swimming pool water purification system. 4,986,906, Cl. 210-169.000.

Daicel Chemical Industries Ltd.: *See*—
Izuka, Akihiro; Onizawa, Yoshio; and Yamashita, Mitsuru, 4,986,938, Cl. 264-1.300.

Dailey, Nils: *See*—
Rai, Vish; Dailey, Nils; Southall, Kenneth; Webster, Timothy; Leeke, Gordon; and Chu, Chaokang, 4,986,909, Cl. 210-198.300.

Daimler-Benz AG: *See*—
Ohlendorf, Rolf; Treyz, Willy; and Speier, Wolfgang, 4,986,801, Cl. 475-331.000.
Tran, Van Tuan, 4,987,542, Cl. 364-424.050.

Daimon, Hideo; Kitakami, Osamu; and Fujiwara, Hideo, to Hitachi, Ltd. Magnetic recording medium. 4,987,039, Cl. 428-694.000.

Dain, Lester C., to Sprague Electric Company. Metal-cased electrolytic capacitor. 4,987,518, Cl. 361-517.000.

Dainippon Screen Mfg. Co., Ltd.: *See*—
Nanri, Seiji, 4,987,444, Cl. 355-69.000.

Dallavalle, Silvano; and Ansaloni, Raffaele, to Cebora S.p.A. Protection circuit for plasma-arc welding and cutting equipment operated with transferred or non-transferred arc. 4,987,285, Cl. 219-121.540.

Damrath, Volker: *See*—
Wittmann, Dieter; Lindner, Christian; Damrath, Volker; Kress, Hans-Jurgen; Peters, Horst; and Schoeps, Jochen, 4,987,184, Cl. 525-63.000.

Dana Corporation: *See*—
Fett, Gregory A., 4,986,608, Cl. 301-124.00R.

Dana Farber Cancer Institute: *See*—
Tedder, Thomas F.; Schlossman, Stuart F.; and Saito, Haruo, 4,987,084, Cl. 436-63.000.

Dandreaux, Gary: *See*—
Login, Robert B.; Merianos, John J.; Dandreaux, Gary; and Shih, Jenn S., 4,987,210, Cl. 526-258.000.

Danfoss A/S: *See*—
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Krenkel, Bernhard; and Joos, Heinz, 4,985,970, Cl. 28-141.000.
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Bai, Shen H., 4,986,334, Cl. 164-312.000.
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Farmer, Herbert B. Spill resistant lid. 4,986,437, Cl. 220-90.200.
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Funari, Michael A., 4,986,044, Cl. 52-213.000.
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Fischer, Artur, to fischerwerke Artur Fischer GmbH & Co. KG. Anchoring plug. 4,986,711, Cl. 411-55.000.
Fischer, Dan E., to Ultradent Products, Inc. Syringe apparatus having improved plunger. 4,986,820, Cl. 604-218.000.
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Bremers, Alan D.; and Osgood, Melvin L., 4,986,300, Cl. 137-315.000.
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Oros, Alvin K.; Noworyta, Rudolf P.; and Sawyer, Fred G., 4,986,002, Cl. 33-354.000.
Panyard, James R.; and Winter, Benjamin P., 4,986,230, Cl. 123-193.00C.
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Ledoux, Patrick R.; and Fourgaut, Luc R., 4,986,951, Cl. 264-516.000.
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Guironnet, Louis; and Bline, Michel, 4,986,955, Cl. 376-261.000.
Mounet, Jean-Charles, 4,986,313, Cl. 138-89.000.
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Braun, Franz-Josef, 4,986,575, Cl. 285-325.000.
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Freeze, Robin J., to Eastman Kodak Company. Anti-wear disk drive system. 4,987,502, Cl. 360-75.000.
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French, Phillip B. Water sport device and associated safety anchoring system. 4,986,784, Cl. 441-65.000.
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Fuji Electric Co., Ltd.: *See*—
Nishiura, Masaharu; and Sakurai, Kenya, 4,987,098, Cl. 437-142.000.
Ozaki, Seishiro; and Asahi, Nobuo, 4,987,395, Cl. 335-17.000.

Fuji Jukogyo Kabushiki Kaisha: *See*—
Morimoto, Yoshihiko, 4,986,396, Cl. 192-0.052.

Fuji Photo Film Co., Ltd.: *See*—
Hirano, Shigeo; Katoh, Kazunobu; Inagaki, Yoshio; and Inoue, Nobuaki, 4,987,052, Cl. 430-264.000.
Horikawa, Kazuo; Miyagawa, Ichirou; and Okada, Kouichi, 4,986,634, Cl. 350-174.000.
Itabashi, Yuichi; Hayashi, Takayuki; and Igarashi, Akira, 4,987,117, Cl. 503-200.000.
Kimura, Kei, 4,987,499, Cl. 358-474.000.
Mikoshiba, Hisashi; Tanaka, Mitsugu; and Kubodera, Seiiti, 4,987,120, Cl. 503-227.000.
Miyasaka, Tsutomu; and Koyama, Koichi, 4,987,032, Cl. 428-411.100.
Ogoda, Makoto, 4,986,527, Cl. 271-250.000.
Saitou, Mitsuo; Ukai, Toshinao; and Ikeda, Tadashi, 4,987,064, Cl. 430-570.000.
Shimazaki, Osamu, 4,987,498, Cl. 358-456.000.
Shinozaki, Fumiaki; and Namiki, Tomizo, 4,987,048, Cl. 430-166.000.
Shinozaki, Fumiaki; and Yagami, Shunzo, 4,987,050, Cl. 430-252.000.
Tamura, Kaoru; and Torii, Shumpeita, 4,987,308, Cl. 250-484.100.
Terai, Fumitaka; Yamagami, Hiroyuki; Uchino, Nobuhiko; and Okazaki, Masaki, 4,987,062, Cl. 430-546.000.

Fuji Valve Co., Ltd.: *See*—
Shida, Toshimitsu, 4,986,166, Cl. 92-52.000.

Fuji Xerox Co., Ltd.: *See*—
Ageishi, Kentaro; and Pu, Lyong S., 4,986,935, Cl. 252-587.000.

Fujii, Hideki: *See*—
Takaoka, Akio; Koike, Noriyuki; and Fujii, Hideki, 4,987,267, Cl. 568-615.000.

Fujii, Masanobu, to Ikeda Bussan Co., Ltd. Method of producing trim board. 4,986,865, Cl. 156-214.000.

Fujii, Yasuji: *See*—
Tanigawa, Toru; Kurihara, Masaaki; Fujii, Yasuji; and Inaba, Toshiaki, 4,986,856, Cl. 148-11.50C.

Fujii, Yoshihalu; Fujita, Hiroshi; and Fujita, Yukitoshi, to Sharp Kabushiki Kaisha. Automatic paper feeder for document shredder. 4,986,481, Cl. 241-30.000.

Fujikiko Kabushiki Kaisha: *See*—
Ikegaya, Isao; Matsumoto, Tadashi; and Sugimoto, Kunihisa, 4,986,514, Cl. 297-362.000.

Fujikura Ltd.: *See*—
Itoh, Kenichiro; Yamada, Takeshi; Onodera, Tsutomu; Yoshinuma, Mikio; and Kato, Yasuyuki, 4,986,843, Cl. 65-152.000.

Fujikura, Takashi: *See*—
Imai, Kazuo; Niigata, Kunihiro; Fujikura, Takashi; and Hashimoto, Shinichi, 4,987,152, Cl. 514-603.000.

Fujimoto, Hiroaki: *See*—
Kisida, Hirosi; Shuto, Akira; Tamaki, Masahiro; Imahase, Tomotoshi; and Fujimoto, Hiroaki, 4,987,145, Cl. 514-394.000.

Fujimura, Keiji: *See*—
Kajioka, Hideki; Fujita, Yasuhiro; and Fujimura, Keiji, 4,987,296, Cl. 250-222.100.

Fujimura, Shuzo; Mihara, Satoru; Kisa, Toshimasa; and Motoki, Yasunari, to Fujitsu Limited. Downstream microwave plasma processing apparatus having an improved coupling structure between microwave plasma. 4,987,284, Cl. 219-121.430.

Fujita, Fumio: *See*—
Masuda, Sadakazu; Fujita, Fumio; Kamata, Masamoto; Yoshini, Masahiko; Ariizumi, Takashi; Okami, Yuji; Takada, Yoshikazu; and Inagaki, Junichi, 4,986,341, Cl. 164-477.000.

Fujita, Hiroshi: *See*—
Fujii, Yoshihalu; Fujita, Hiroshi; and Fujita, Yukitoshi, 4,986,481, Cl. 241-30.000.

Fujita, Hiroyuki: *See*—
Shinada, Sigeo; Fujita, Hiroyuki; and Nagata, Yoichi, 4,987,568, Cl. 370-15.000.

Fujita, Toshiyuki: *See*—
Kobayashi, Akihiro; Fujita, Toshiyuki; Saito, Takayuki; Kawai, Hiromasa; Hosoi, Yutaka; and Shibata, Hideaki, 4,986,648, Cl. 351-160.00R.

Fujita, Tsuneo, to NEC Corporation. Peak voltage holding circuit. 4,987,323, Cl. 307-351.000.

Fujita, Yasuhiro: *See*—
Kajioka, Hideki; Fujita, Yasuhiro; and Fujimura, Keiji, 4,987,296, Cl. 250-222.100.

Fujita, Yasuo: *See*—
Ohnishi, Kazuhiko; Miki, Shoji; Fujita, Yasuo; Tsubota, Hiroki; and Uosaki, Katsuji, 4,987,603, Cl. 382-25.000.

Fujita, Yasuyuki: *See*—
Hanai, Toshimichi; Nagashima, Hideyuki; and Fujita, Yasuyuki, 4,986,603, Cl. 297-468.000.

Fujita, Yukitoshi: *See*—
Fujii, Yoshihalu; Fujita, Hiroshi; and Fujita, Yukitoshi, 4,986,481, Cl. 241-30.000.

Fujitsu Limited: *See*—
Fujimura, Shuzo; Mihara, Satoru; Kisa, Toshimasa; and Motoki, Yasunari, 4,987,284, Cl. 219-121.430.
Suzuki, Takaaki; and Gotou, Hiroshi, 4,987,470, Cl. 357-049.000.
Watanabe, Kiyoshi, 4,987,562, Cl. 357-67.000.
Watarai, Shinichi; Houki, Yoji; and Nonomura, Tomohiro, 4,986,528, Cl. 271-265.000.

Fujitsu Ten Limited: *See*—
Kajioka, Hideki; Fujita, Yasuhiro; and Fujimura, Keiji, 4,987,296, Cl. 250-222.100.

Fujiwara, Hideo: *See*—
Daimon, Hideo; Kitakami, Osamu; and Fujiwara, Hideo, 4,987,039, Cl. 428-694.000.

Fukada, Isao: *See*—
Kuragano, Morimasa; Iwasaki, Kozo; Isobe, Takeshi; Fukada, Isao; Koshibe, Minoru; Sezaki, Yoshihiro; Segawa, Hirozo; and Yoguchi, Katsuji, 4,987,252, Cl. 562-600.000.

Fukada, Takeshi: *See*—
Suzuki, Kunio; Fukada, Takeshi; Kinka, Mikio; Abe, Masayoshi; Shibata, Katsuhiko; Susukida, Masato; Ishida, Noriya; Satake, Akemi; and Arai, Yasuyuki, 4,987,005, Cl. 427-39.000.
Yamazaki, Shunpei; Suzuki, Kunio; Nagayama, Susumu; Inujima, Takashi; Abe, Masayoshi; Fukada, Takeshi; Kinka, Mikio; Kobayashi, Ippei; Shibata, Katsuhiko; Susukida, Masato; and Koyanagi, Kaoru, 4,986,213, Cl. 118-719.000.

Fukao, Masami: *See*—
Suzukamo, Gohfu; and Fukao, Masami, 4,987,114, Cl. 502-341.000.

Fukasawa, Junichi; Shirakawa, Noriko; and Tsutsumi, Hisao, to Kao Corporation. Polyaluminum dialkyl phosphate, oil gelling agent comprising the same, and composition for external application comprising the same. 4,987,241, Cl. 556-174.000.

Fukase, Hisahiko; Matsui, Kunio; Nomura, Akihiro; and Hirata, Atsushi, to Ishikawajima-Harima Heavy Industries Co., Ltd. Twin-roll type continuous casting machine. 4,986,336, Cl. 164-415.000.

Fukuda, Hiroyuki: *See*—
Yokota, Akira; Fukuda, Hiroyuki; and Takahashi, Susumu, 4,986,642, Cl. 350-432.000.

Fukuda, Yasuhiro; and Kitazawa, Shooji, to Oki Electric Industry Co., Ltd. Encapsulated FET semiconductor device with large W/L ratio. 4,987,464, Cl. 357-23.800.

Fukuma, Yoshitaka; and Iizuka, Taiji, to Sharp Kabushiki Kaisha. Data transmission processing machine. 4,987,588, Cl. 379-98.000.

Fukumoto, Takaaki: *See*—
Ohmori, Toshiaki; and Fukumoto, Takaaki, 4,986,216, Cl. 118-730.000.

Fukushima, Masayuki: *See*—
Funaki, Yuji; and Fukushima, Masayuki, 4,987,247, Cl. 560-23.000.

Fukushima, Yoshiaki: *See*—
Mizutani, Tadashi; Fukushima, Yoshiaki; Doi, Haruo; and Kamigaito, Osami, 4,987,106, Cl. 501-147.000.

Fukushima, Yoshihisa; Satoh, Isao; Ichinose, Makoto; Kuroki, Yuzuru; and Takagi, Yuuji, to Matsushita Electric Industrial Co., Ltd. Information recording and reproducing apparatus with management of defective sector. 4,986,668, Cl. 369-59.000.

Fukutani, Iwao, to Murata Manufacturing Co., Ltd. Electrical connector having terminals and retainer for protecting the terminals during transportation. 4,986,772, Cl. 439-892.000.

Fukuyama, Masahiro: *See*—
Takao, Hiroyoshi; Yoshida, Nobuyuki; Ikeda, Kiyosi; and Fukuyama, Masahiro, 4,987,199, Cl. 525-327.300.

Fukuyama, Tatsuo; Okada, Toshihiko; Moriguchi, Sanseki; Kamiya, Yoshio; and Ogata, Eisuke, to Nippon Kokan Kaubshiki Kaisha. Preparation of coal liquefaction catalyst. 4,987,113, Cl. 502-338.000.

Fulkerson, Terrence M.: *See*—
Hollstein, Thomas E.; Keefer, Larry W.; Fulkerson, Terrence M.; and Gray, Kenneth W., 4,986,210, Cl. 118-629.000.

Fultz, Robb M., to Emhart Industries, Inc. Fastener assembly. 4,986,712, Cl. 411-428.000.

Funabashi, Hirofumi: *See*—
Sugiyama, Susumu; Yamashita, Shiro; and Funabashi, Hirofumi, 4,986,131, Cl. 73-766.000.

Funaki, Yuji; and Fukushima, Masayuki, to Sumitomo Chemical Company, Limited. Production of tetrahydrophthalimide compound. 4,987,247, Cl. 560-23.000.

Funari, Michael A., to Fenestra Corporation. Adjustable door frame. 4,986,044, Cl. 52-213.000.

Funato, Hiroyoshi: *See*—
Kobayashi, Hiroshi; Machida, Haruhiko; Akedo, Jun; and Funato, Hiroyoshi, 4,987,299, Cl. 250-231.140.

Funk, Erwin D., to Kamyr, Inc. Method and apparatus for liquid treatment of and liquid extraction on a paper pulp. 4,986,881, Cl. 162-56.000.

Furnace Juko Kabushiki Kaisha: *See*—
Sakamoto, Hidasato, 4,986,750, Cl. 432-131.000.

Furno, John S.; and Nauman, E. Bruce, to General Electric Company. Impact modification of a heat resistant thermoplastic polyimide. 4,987,188, Cl. 525-180.000.

Furukawa Electric Co., Ltd., The: *See*—
Tanigawa, Toru; Kurihara, Masaaki; Fujii, Yasuji; and Inaba, Toshiaki, 4,986,856, Cl. 148-11.50C.

Furukawa Special Metal Co., Ltd.: *See*—
Tanigawa, Toru; Kurihara, Masaaki; Fujii, Yasuji; and Inaba, Toshiaki, 4,986,856, Cl. 148-11.50C.

Furumoto, Horace: *See*—
Cho, George E.; and Furumoto, Horace, 4,986,258, Cl. 128-7.000.
Furuya, Yoshiyuki: *See*—
Aoki, Kunimitsu; Miyazawa, Yasuhiro; Ichikawa, Hiroshi; and Furuya, Yoshiyuki, 4,986,631, Cl. 350-112.000.
Fushiya, Fusao; and Okumura, Michio, to Makita Electric Works, Ltd. Torque adjusting mechanism for power driven rotary tools. 4,986,369, Cl. 173-12.000.
Futcher, Ralph J.: *See*—
Masek, Jiri; Futcher, Ralph J.; and Dixon, James R., 4,986,177, Cl. 100-163.00R.
Gabor, Racz: *See*—
Levente, Szekely; Gabor, Racz; and Karolyne, Otta, 4,987,541, Cl. 364-424.040.
Gadda, Cesare: *See*—
Rizzo, Giorgio; Cilia, Giuseppe; and Gadda, Cesare, 4,987,307, Cl. 250-368.000.
GAF Chemicals Corporation: *See*—
Login, Robert B.; Merianos, John J.; Dandreaux, Gary; and Shih, Jenn S., 4,987,210, Cl. 526-258.000.
Gailbreath, Samuel H.; Shelton, Boyd N.; and Hilton, Richard L., to Hewlett-Packard Company. Method and apparatus for preventing parasitic electrical discharges in magnetic disk drives. 4,987,514, Cl. 361-220.000.
Gainforth, Douglas. Apparatus for handling and wrapping bales. 4,986,057, Cl. 53-556.000.
Galbreath, Donald E., to Galbreath Incorporated. Roll-off hoist for variable positioning of containers. 4,986,719, Cl. 414-478.000.
Galbreath Incorporated: *See*—
Galbreath, Donald E., 4,986,719, Cl. 414-478.000.
Gallagher, Stephen F., to Shell Internationale Research. Control of foam build up in a fermenter. 4,987,082, Cl. 435-289.000.
Galtier, Lucien; Barthelemy, Andre; and Herbreteau, Roger, to Automobiles Peugeot; and Automobiles Citroen. Vehicle suspension with variable damping. 4,986,568, Cl. 280-707.000.
Gamerdinger, Gustav, to Wandel & Goltermann GmbH & Co. Optical head adapted to receive a light guide plug. 4,986,621, Cl. 350-96.200.
Gandrud, S. Garfield. Ring and point strobe. 4,987,433, Cl. 354-132.000.
Gansale, Robert C., to Hubbell Incorporated. Electrical cable with spirally wrapped wires. 4,986,372, Cl. 174-106.0SC.
Garabedian, George, to Stone & Webster Engineering Corporation. Passive nuclear power plant containment system. 4,986,956, Cl. 376-283.000.
Garbe, Heyno; and Konigstein, Dietrich, to Asea Brown Boveri Ltd. Process for manufacturing a cylindrical body and a device for carrying out the process. 4,986,701, Cl. 408-1.00R.
Garcia, Ricardo. Roller type applicator for paint. 4,985,958, Cl. 15-114.000.
Gardner, John F.: *See*—
Zoltner, John D.; Carter, Daniel L.; Lipani, Anthony F.; and Gardner, John F., 4,986,713, Cl. 412-34.000.
Gardner, John P. Method to produce pre-recorded tape cassettes. 4,987,503, Cl. 360-90.000.
Garoche, Didier: *See*—
Grollier, Jean F.; Cotteret, Jean; and Garoche, Didier, 4,985,955, Cl. 8-406.000.
Garrett, Billy W., Jr., to NCR Corporation. Apparatus for creating a cursor pattern by strips related to individual scan lines. 4,987,551, Cl. 364-521.000.
Garsee, Henry A.: *See*—
Sarrine, Robert J.; Garsee, Henry A.; Kelley, Charles D.; and Guadagno, Philip A., 4,986,891, Cl. 204-299.00R.
Gartland, Frederick H., to Rolls-Royce. Method of supporting a core in a mold. 4,986,333, Cl. 164-30.000.
Gary, Lonnie F., to Gary Products Group, Inc. Decorative light pedestal with hinged closure. 4,986,504, Cl. 248-205.300.
Gary Products Group, Inc.: *See*—
Gary, Lonnie F., 4,986,504, Cl. 248-205.300.
Gassmann, Gerhard-Gunter, to Gassmann GmbH. Matrix-type advertising device. 4,986,014, Cl. 40-472.000.
Gassmann GmbH: *See*—
Gassmann, Gerhard-Gunter, 4,986,014, Cl. 40-472.000.
Gaylord, Thomas K.; Brennan, Kevin F.; and Glytsis, Elias N., to Georgia Tech Research Corporation. Semiconductor biased superlattice tunable interference filter/emitter. 4,987,458, Cl. 357-4.000.
Gaz De France: *See*—
le Squin, Guy; and Laurent, Dominique, 4,987,297, Cl. 250-227.210.
GB Biotech Inc.: *See*—
Hackl, Ralph P.; Wright, Frank R.; and Bruynesteyn, Albert, 4,987,081, Cl. 435-262.000.
Gebr. Happich GmbH: *See*—
Kaiser, Klaus P.; Viertel, Lothar; and Welter, Patrick, 4,986,592, Cl. 296-97.800.
Gee, Gregory P., to General Motors Corporation. Temperature compensated flowmeter techniques. 4,987,549, Cl. 364-510.000.
Geffroy, Robert; Geoffroy, Christophe; and Forster, Lloyd M. Piston and multilayer piston ring set. 4,986,168, Cl. 92-194.000.
Geisler, Michael: *See*—
Katzschner, Werner; Eichholz, Stefan; Geisler, Michael; and Jung, Michael, 4,987,346, Cl. 315-111.410.
Geka, Toshiaki, to Nippon Thompson Co., Ltd. Apparatus for transporting machine tools and work tools. 4,986,725, Cl. 414-751.000.
Gelardi, Anthony L.; Lovecky, Craig; Lowry, Alan; and Barstow, Robert, to Shape, Inc. Reel leaf spring/cassette cover combinations and methods for assembly. 4,986,491, Cl. 242-199.000.
General Dynamics Corporation: *See*—
Hethcoat, Gary L., 4,986,462, Cl. 228-180.100.
General Dynamics Corp., Air Defense Systems Div.: *See*—
Hethcoat, Gary L., 4,986,471, Cl. 239-3.000.
General Dynamics Corporation Air Defense Systems Division, Pomona Facility: *See*—
LaRocca, Edward W.; and Andersson, Norman H., 4,986,186, Cl. 102-464.000.
General Electric Company: *See*—
Eckberg, Richard P., 4,987,158, Cl. 522-31.000.
Eggleston, Brian E.; and Katz, Allen, 4,987,378, Cl. 330-149.000.
Erdmann, Omer D., 4,986,737, Cl. 416-190.000.
Furno, John S.; and Nauman, E. Bruce, 4,987,188, Cl. 525-180.000.
Glover, Gary H.; and Schneider, Erika, 4,987,371, Cl. 324-320.000.
Kidd, Harold J.; and Anderson, Paul R., 4,987,585, Cl. 378-197.000.
Kinnard, Kenneth P.; Strong, Richard T., Jr.; Goldfarb, Samuel; and Tower, John R., 4,987,295, Cl. 250-208.100.
Kosmatka, Walter J.; Zalar, Frank E.; and Tener, Dean R., 4,987,343, Cl. 315-82.000.
Laskaris, Evangelos T., 4,986,078, Cl. 62-51.100.
Lee, Ching-Pang; Venkataramani, Kattalaicheri S.; Laht, Daniel J.; and Lee, Vincent H., 4,986,068, Cl. 60-270.100.
Leskovec, Robert A.; Davenport, John M.; and Allison, Joseph M., 4,987,347, Cl. 315-209.00R.
Richards, John C.; and Smith, Joseph P., Jr., 4,986,305, Cl. 137-625.150.
Taylor, Dale F., 4,986,957, Cl. 376-417.000.
Travanty, Frank C.; Allen, Philip M.; and Chopra, Vinod K., 4,987,583, Cl. 378-91.000.
General Instrument Corporation: *See*—
Korwin-Pawlowski, Michael, 4,987,476, Cl. 357-74.000.
General Motors Corporation: *See*—
Disser, Robert J.; Foust, Jeff A.; Lehnhoff, Richard N.; Graham, Donald E.; and Heaston, Bruce A., 4,987,351, Cl. 318-78.000.
Gee, Gregory P., 4,987,549, Cl. 364-510.000.
Masaki, Ichiro, 4,987,357, Cl. 318-587.000.
Murphy, John W.; Haitz, Albert G.; and Myers, Kenneth L., 4,987,330, Cl. 310-217.000.
Ricker, Dennis J.; and Foster, Richard L., 4,986,614, Cl. 303-115.000.
Wu, Ko-Jen; and Davis, Richard S., 4,986,225, Cl. 123-52.0MF.
Genma, Nobuhiro: *See*—
Sato, Itsuko; Naito, Katsuyuki; Genma, Nobuhiro; and Azuma, Makoto, 4,987,023, Cl. 428-215.000.
Geoffroy, Christophe: *See*—
Geffroy, Robert; Geoffroy, Christophe; and Forster, Lloyd M., 4,986,168, Cl. 92-194.000.
George Angus & Company Limited: *See*—
Preston, Stuart; Holloran, Robert; and Lidgate, Brian, 4,986,553, Cl. 277-152.000.
Georgia-Pacific Resins, Inc.: *See*—
Fiske, Larry B., 4,986,925, Cl. 252-70.000.
Georgia Tech Research Corporation: *See*—
Gaylord, Thomas K.; Brennan, Kevin F.; and Glytsis, Elias N., 4,987,458, Cl. 357-4.000.
Geringer, Arthur; Geringer, Richard; and Geringer, David. Electromagnetic door lock device. 4,986,581, Cl. 292-251.500.
Geringer, David: *See*—
Geringer, Arthur; Geringer, Richard; and Geringer, David, 4,986,581, Cl. 292-251.500.
Geringer, Richard: *See*—
Geringer, Arthur; Geringer, Richard; and Geringer, David, 4,986,581, Cl. 292-251.500.
Germanaud, Laurent; Truong Dinh, Nguyen; Marie, Gilbert; and Turello, Patrick, to Societe Nationale Elf Aquitaine. Polymeric compounds especially useful as additives to lubricants and compositions containing said compounds. 4,986,924, Cl. 252-51.50A.
Gerosa, Alessandro; Rogora, Edoardo; Villa, Ezio; and Susa, Andrea, to Alfa Lancia S.p.A. Control unit for the pilot lamps of the instrument board of an automotive vehicle. 4,987,404, Cl. 340-461.000.
Gerosa, Gianfranco: *See*—
Fernandez, Virgilio A.; and Gerosa, Gianfranco, 4,987,327, Cl. 307-491.000.
Gersdorf, Joachim; and Rose, Klaus, to Hoechst Aktiengesellschaft. Polymerizable compounds, and a radiation-polymerizable mixture containing same. 4,987,053, Cl. 430-277.000.
Gersdorf, Joachim: *See*—
Rode, Klaus; Mohr, Dieter; Frass, Werner; and Gersdorf, Joachim, 4,987,055, Cl. 430-277.000.
Gerstein, Terry, to Revlon, Inc. Superfatted betaine and zwitterionic hair and skin conditioner compositions. 4,986,983, Cl. 424-070.000.
Gerth, Klaus: *See*—
Reichenbach, Hans; Hofle, Gerhard; Augustiniak, Hermann; Bedorf, Norbert; Gerth, Klaus; Irschik, Herbert; Jansen, Rolf; Kunze, Brigitte; Schomburg, Dietmar; Steinmetz, Heinrich; Trowitzsch-Kienast, Wolfram; and Wray, Victor, 4,987,072, Cl. 435-119.000.
Gesellschaft fur Biotechnologische Forschung GmbH: *See*—
Reichenbach, Hans; Hofle, Gerhard; Augustiniak, Hermann; Bedorf, Norbert; Gerth, Klaus; Irschik, Herbert; Jansen, Rolf; Kunze, Brigitte; Schomburg, Dietmar; Steinmetz, Heinrich; Trowitzsch-Kienast, Wolfram; and Wray, Victor, 4,987,072, Cl. 435-119.000.

Gesellschaft fur Biotechnologische Forschung mbh, Braunschweig: *See*—
Bohlendorf, Bettina; Bedorf, Norbert; Hofle, Gerhard; Schummer, Dietmar; and Sutter, Marius, 4,987,149, Cl. 514-450.000.
GFI Gesellschaft fur Industrieausrustung mbH: *See*—
Knapp, Hubert; and Hoffman, Peter, 4,986,847, Cl. 75-525.000.
Giamattei, Frank J. Adjustable telescope mount for an archery bow. 4,986,001, Cl. 33-265.000.
Gibbs, Danny R.; Burgess, Patrick A.; Kurklis, William J.; and Harger, Mark A., to Landis & GYR Metering, Inc. Electric energy meter with power outage recovery circuit. 4,987,363, Cl. 324-142.000.
Gibbs, Ronald T.: *See*—
Braun, Robert E.; and Gibbs, Ronald T., 4,987,478, Cl. 357-81.000.
Gicewicz, Gerald P. Vehicle diagnostic device. 4,986,119, Cl. 73-146.000.
Giehsler, Kurt: *See*—
Wagner, Werner; Bruder, Axel; and Giehsler, Kurt, 4,987,029, Cl. 428-319.300.
Gilbarco Inc.: *See*—
Young, Harold R.; McSpadden, John S.; McMordie, James R.; and Smith, Leon B., 4,986,445, Cl. 222-71.000.
Gilbreath, G. Charmaine; and Davidson, Frederic M., to United States of America, Navy. Efficient dynamic phasefront modulation system for free-space optical communications. 4,987,607, Cl. 455-618.000.
Gill, Hardayal S.; and Hesterman, Victor W., to Hewlett-Packard Company. Magnetoresistive head structures for longitudinal and perpendicular transition detection. 4,987,509, Cl. 360-113.000.
Gill, Patrick: *See*—
Rowley, William R. C.; and Gill, Patrick, 4,987,574, Cl. 372-28.000.
Gillette Company, The: *See*—
Kawam, Antoine; Lee, Shu-Sen; and Lazar, Harvey A., 4,987,243, Cl. 556-27.000.
Gilmour, John E., to Westinghouse Electric Corp. Synthetic aperture minimum redundancy sonar apparatus. 4,987,563, Cl. 367-88.000.
Giuseppe Ratti Industria Ottica S.p.A.: *See*—
Blumenthal, Oreste, 4,986,647, Cl. 351-51.000.
Glace, William R.; and Ibsen, Robert L., to Den Mat Corporation. Toothpaste having low abrasion. 4,986,981, Cl. 424-50.000.
Gladden, Robert H., Jr.; and Thomas, Phillip M. Cable connecting device. 4,986,761, Cl. 439-99.000.
Gladish, William C. Detachable hanging headrest/pillow. 4,985,950, Cl. 5-437.000.
Glaros, Timothy L.; Soissons, Florent; and McEvoy, Joe, to Vie de France Bakery Corporation. Partially baked croissant and pastry and method of manufacture. 4,986,992, Cl. 426-19.000.
Glory Kogyo Kabushiki Kaisha: *See*—
Ohnishi, Kazuhiko; Miki, Shoji; Fujita, Yasuo; Tsubota, Hiroki; and Uosaki, Katsuji, 4,987,603, Cl. 382-25.000.
Glover, Gary H.; and Schneider, Erika, to General Electric Company. Method for in-vivo shimming. 4,987,371, Cl. 324-320.000.
Glueck, Herbert: *See*—
Richter, Axel; Lardy, Patric; Schempp, Ulrich; and Glueck, Herbert, 4,986,232, Cl. 123-481.000.
Glytsis, Elias N.: *See*—
Gaylord, Thomas K.; Brennan, Kevin F.; and Glytsis, Elias N., 4,987,458, Cl. 357-4.000.
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Corser, George A.; Hammond, Gary C.; and Eddy, Dale P., 4,986,135, Cl. 73-861.420.
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Baatz, Henning; and Rittscher, Dieter, 4,987,313, Cl. 250-506.100.
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Godbersen, Byron L. Fender unit for use with a boat trailer or the like. 4,986,571, Cl. 280-854.000.
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Godyak, Valery, to GTE Products Corporation. Self-ballasted glow discharge lamp having indirectly-heated cathode. 4,987,342, Cl. 315-49.000.
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Gohier, Pierre R., to Wedge Products Inc. Baggage cart body. 4,986,596, Cl. 296-203.000.
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Gokee, Doanld J., to Babcock Industries, Inc. Shifter brake interlock system. 4,986,399, Cl. 192-4.00A.
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Goldstar Co., Ltd.: *See*—
Moon, Bum K., 4,986,109, Cl. 73-7.000.
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Gongwer, Dean, to Nelgo Manufacturing, Inc. Automatic food cooking machine. 4,986,174, Cl. 99-345.000.
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Yates, Stephen F.; Good, Mary L.; and Brubaker, Inara M., 4,986,921, Cl. 210-758.000.
Goodin, Jonathan W.: *See*—
Sondergeld, Manfred; and Goodin, Jonathan W., 4,987,054, Cl. 430-275.000.
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Goron, John; Renza, Ronald G.; Crosby, Robert J.; and Sodtalbers, Erich W., to Komline-Sanderson Engineering Corporation. Dewatering process and apparatus. 4,986,911, Cl. 210-396.000.
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Goshima, Takahiro; Yogo, Kazutoshi; Wakata, Hideo; and Kishimoto, Masashi, to Nippondenso Co., Ltd. Anti-lock brake control system for use in motor vehicle. 4,986,611, Cl. 303-100.000.
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Goto, Motoomi, to Yamaha Corporation. Acoustic apparatus. 4,987,601, Cl. 381-159.000.
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Gotoh, Shiroh, to Mitsubishi Petrochemical Company Limited. Process for producing unsaturated copolymers. 4,987,193, Cl. 525-313.000.
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Tsunekawa, Tetsuya; Gotoh, Tetsuya; and Egawa, Keiichi, 4,987,255, Cl. 564-119.000.
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Gould, Christopher E. Net forming method. 4,985,980, Cl. 29-525.100.
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Grant, Fred W. Emergency hand truck. 4,986,563, Cl. 280-640.000.
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Kennedy, Richard A.; Zarabadi, Seyed R.; Inman, Stephen L.; and Gravenstein, Martin G., 4,987,387, Cl. 331-1.00A.
Graves, R. Garry. Cushioned clamp for securing a dental dam. 4,986,752, Cl. 433-138.000.
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Gray, Gary W.: *See*—
Meier, Robert H.; Seel, Jerry E.; and Gray, Gary W., 4,986,534, Cl. 272-96.000.
Gray, Henry F.; and Greene, Richard F., to United States of America, Navy. Field emitter array integrated distributed amplifiers. 4,987,377, Cl. 330-54.000.
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Gray, William R., III. Digital logic window panel. 4,987,401, Cl. 340-332.000.
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Schmidt, Helmut; Grecksch, Ernst; and Eisenmann, Manfred, 4,987,329, Cl. 310-156.000.
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Greene, Richard F.: *See—*
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Dye, Clifford L.; Greenwood, Leon D.; Traxler, Mark T.; and Noren, Lawrence J., III, 4,986,675, Cl. 384-192.000.
Greivenkamp, John E., Jr., to Eastman Kodak Company. System for scanning halftoned images. 4,987,496, Cl. 358-448.000.
Griffin, Elon. Security lock mechanism. 4,986,577, Cl. 292-48.000.
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Burney, Bryan T.; Griffith, Steven L.; Fry, Francis J.; Jang, Yue-Teh; Thornton, Pamela M.; and Liebmann, Vern L., 4,986,814, Cl. 604-164.000.
Griffiths, Gerald A.: *See—*
Watkins, David R.; Griffiths, Gerald A.; and Ingley, Peter, 4,986,326, Cl. 152-532.000.
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Grob, Howard S.; and Friedman, Frank. Method for in vitro maturation of oocytes. 4,987,080, Cl. 435-240.250.
Groenendaal, John C., Jr.: *See—*
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Grollier, Jean F.; Cotteret, Jean; and Garoche, Didier, to L'Oreal. Process for dyeing keratinous fibres with couplers and/or "rapid" oxidation dyes combined with an iodide and dyeing composition employed. 4,985,955, Cl. 8-406.000.
Gross, Allen E.; and Malm, Marvin F., to Compaq Computer Corporation. Modem-telephone interconnect. 4,987,586, Cl. 379-93.000.
Gross, Donald S., Sr. Chain saw attachment. 4,985,997, Cl. 30-122.000.
Grossman, Shlomo; and Albeck, Michael, to Bar Ilan University. Method of treating skin virus infections. 4,986,985, Cl. 424-195.100.
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Zinn, Bernd; and Lolic, Srboalav, 4,986,770, Cl. 439-752.000.
Grove, Michael M., to Sundstrand Data Control, Inc. Aircraft terrain warning system with configuration modified warning and improved mode switching. 4,987,413, Cl. 340-970.000.
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Gruber, Gary A.: *See—*
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Gruenberg, Jeff D.: *See—*
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Grumman Aerospace Corporation: *See—*
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Niemi, Ingemar; and Andersson, Lars-Erik, 4,986,374, Cl. 175-86.000.
GTE Government Systems Corporation: *See—*
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GTE Laboratories Incorporated: *See—*
Buhrer, Carl F., 4,987,567, Cl. 370-3.000.
GTE Products Corporation: *See—*
Godyak, Valery, 4,987,342, Cl. 315-49.000.
Spencer, James R.; and Mullendore, James A., 4,986,961, Cl. 419-36.000.
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Guadagno, Philip A.: *See—*
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Guenther, Kenneth L.: *See—*
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Guillot, Christian: *See—*
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Guironnet, Louis; and Bline, Michel, to Framatome; and Cogema. Device for removing peripheral fuel rods from a fuel assembly of a nuclear reactor. 4,986,953, Cl. 376-261.000.
Gullichsen, Johan; Nilsson, Bengt; and Hoglund, Ronny, to Kamyr AB. Method and apparatus for feeding a conical refiner. 4,986,480, Cl. 241-28.000.
Gunn, Charles L.; and Apke, Robert J., to Proctor & Gamble Company, The. Package with multi-ply side panels and strap handle. 4,986,420, Cl. 206-607.000.
Gunstone, Frank D.: *See—*
Barlow, Stuart M.; Gunstone, Frank D.; Hardy, Roy; and Thorisson, Snorri, 4,986,996, Cl. 426-545.000.
Gupta, Sankar Das; and Jacobs, James K. Process and apparatus for generating high density hydrogen in a matrix. 4,986,887, Cl. 204-129.000.
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Saur, Wolfgang; Tonolla, Robert; Taschke, Franz; and Staemmele, Siegfried, 4,986,443, Cl. 222-1.000.
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Mogilevsky, Ilya M.; Vengerov, Igor A.; Gusar, Alexandr G.; Makarov, onstantin A.; and Chebyshev, Alexei E., 4,986,652, Cl. 356-2.000.
Gust, Giselher R., to Hydro Data Inc. Fluid velocity measurement instrument. 4,986,122, Cl. 73-204.150.
Gute, Robert M., to Huron Products Corporation. Flow control device. 4,986,312, Cl. 138-45.000.
Gwathmey, Richard B., to Pallet Systems, Inc. Blank preform and tray pallet. 4,986,418, Cl. 206-386.000.
Gwo-Jiang, Liaw. Multipurpose crimper for cable connection. 4,986,106, Cl. 72-410.000.
H. G. Weber & Co., Inc.: *See—*
Splitstoser, Bradley S.; and Klaeser, Richard, 4,986,411, Cl. 198-475.100.
H.I. Holweg International: *See—*
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Haage, Hans-Jurgen: *See—*
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Haas, Gunther: *See—*
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Habicher, Berthold H.: *See—*
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Habig, Kurt C.: *See—*
Hunger, Klaus; Frolich, Heinrich; and Habig, Kurt C., 4,987,258, Cl. 564-309.000.
Hachtel, Hans; Maier, Michael; and Ehmig, Gerhard, to Hilti Aktiengesellschaft. Fastening element assembly. 4,986,709, Cl. 411-30.000.
Hackl, Ralph P.; Wright, Frank R.; and Bruynesteyn, Albert, to GB Biotech Inc. Chemical/biological process to oxidize multimetallic sulphide ores. 4,987,081, Cl. 435-262.000.
Haen, William G.; and Pfefferkorn, Earle L., to Greene Manufacturing Co. Bar burner. 4,986,254, Cl. 126-41.00R.
Haertl, Christof, to Siemens Aktiengesellschaft. Apparatus for closing openings of a heating aid or an ear adaptor for hearing aids. 4,987,597, Cl. 381-69.000.
Haessner, Winfried; Kugler, Georg; and Wolf, Robert, to J. M. Voith GmbH. Process for drying a material web and device for the application of the process. 4,986,009, Cl. 34-23.000.
Hafner, Otto P. Strip locking joint & method of making same. 4,986,691, Cl. 403-375.000.
Hafner, Paul; and Schiel, Christian, to J.M. Voith GmbH. Holding arrangement for a device directed against a linearly adjustable roll, such as a doctor blade, blowing device or similar. 4,986,178, Cl. 100-174.000.
Haga, Takahiro; Yamada, Nobutoshi; Sugi, Hideo; Kobayanagi, Toru; and Okada, Hiroshi, to Ishihara Sangyo Kaisha Ltd. Substituted benzene derivatives, processes for their production and antitumor compositions containing them. 4,987,135, Cl. 514-274.000.
Hagiwara, Katsunobu, to Kabushiki Kaisha Kobe Seiko Sho. Roller head opening and closing apparatus in roller head extruder. 4,986,745, Cl. 425-182.000.
Hahmann, Wolfgang; Kirchhoff, Johannes; and Sandkuhler, Georg, to Barmag AG; and Edelhoff Polytechnik GmbH & Co. Hydraulic cylinder control system for garbage collection truck lift-dump handler. 4,986,074, Cl. 60-468.000.
Hahnewald, Andrea; Mothrath, Georg; Schamberg, Stefan; and Ulrich, Volker, to Braun Aktiengesellschaft. Electric bread toaster. 4,986,173, Cl. 99-338.000.
Haikawa, Katsumasa, to Hitachi, Ltd. Fuel assembly. 4,986,958, Cl. 376-419.000.
Haitz, Albert G.: *See—*
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Hajto, Jeno , to Bayeriache Motoren Werke AG. Wheel suspension system for vehicles. 4,986,565, Cl. 280-667.000.
Haken, Roger A.: *See—*
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Halajian, Eugene M.: *See*—
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Hallen, Ted S.: *See*—
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Halligan, Christopher J., Jr.: *See*—
Halligan, Christopher J., Sr.; and Halligan, Christopher J., Jr., 4,986,389, Cl. 182-138.000.
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Hamada, Munemitsu: *See*—
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Hamada, Tomoyuki; Kamezima, Kohzi; Takeuchi, Ikuo; and Watanabe, Yuriko, to Hitachi, Ltd. Perspective display device for displaying and manipulating 2-D or 3-D cursor, 3-D object and associated mark position. 4,987,527, Cl. 364-167.010.
Hamade, Saburo: *See*—
Morohashi, Kazuo; Kawasaki, Masayoshi; Tsukabayashi, Kazuo; and Hamade, Saburo, 4,986,316, Cl. 139-452.000.
Hamamoto, Tadanao; Wakiya, Tadashi; and Hayashi, Kazunari, to Kabushiki Kaisha Tokai Denki Seisakusho. Electric rearview mirror device for a vehicle. 4,986,646, Cl. 350-637.000.
Hamamura, Chiyo: *See*—
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Hamamura, Fumio, to Somar Corporation. Thin-film coating apparatus. 4,986,873, Cl. 156-552.000.
Hamano, Takahiro; Matsui, Masataka; and Isobe, Mitsuo, to Kabushiki Kaisha Toshiba. Semiconductor memory device. 4,987,560, Cl. 365-200.000.
Hamatani, Toshiji: *See*—
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Hamel, Manfred, to Siemens Aktiengesellschaft. An oscillator damped test and evaluation circuit for a proximity switch. 4,987,366, Cl. 324-207.260.
Hamlin, Virgil E., Jr. Tool for removing tabs and brackets from windshields. 4,986,875, Cl. 156-584.000.
Hammond, Gary C.: *See*—
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Han, Byung H.: *See*—
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Han, Yong N.; Han, Byung H.; Baik, Soung K.; and Kim, Tae H., to Cheil Sugar & Co., Ltd. Antithrombotic activity of the triterpenoids of ilex pubescens and the conversion method of the triterpenoids of ilex pubescens having no antithrombotic activity into the triterpenoids having antithrombotic activity. 4,987,125, Cl. 514-33.000.
Hanai, Toshimichi; Nagashima, Hideyuki; and Fujita, Yasuyuki, to Tachi-S Co., Ltd.; and Nissan Motor Co., Ltd. Frame of a vehicle seat provided with a child seat. 4,986,603, Cl. 297-468.000.
Hanano Commercial Co., Ltd.: *See*—
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Hang, Hoi L. R. Shape identification toy vehicle assembly. 4,986,789, Cl. 446-93.000.
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Haraldsen, Hans F. T., to Norsk Hydro a.s. Method for removal of heavy metals, especially cadmium, from phosphoric acid containing solutions. 4,986,970, Cl. 423-321.00R.
Harashima, Ikuo: *See*—
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Hardaway, Anthony H.: *See*—
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Harding, Warren B.: *See*—
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Hardy, Patrice: *See*—
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Hardy, Roy: *See*—
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Harger, Mark A.: *See*—
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Harker, Larry A.: *See*—
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Harlow, Harry B.: *See*—
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Harman, R. Keith; and Smith, Kenneth L., to Senstar Corporation. Leaky cables. 4,987,394, Cl. 333-237.000.
Harmon, J. David: *See*—
Domigan, Charles N.; and Harmon, J. David, 4,986,045, Cl. 52-221.000.
Harris, Norman D. Dynamic action bird feeder. 4,986,219, Cl. 119-57.800.
Harrison, Anthony W., to Lucas Industries Public Ltd. Co. Power assistance for vehicle steering mechanisms. 4,986,382, Cl. 180-148.000.
Harrison, John M.; Marshburn, Hubert L.; and Stout, Ron, deceased (by Stout, Sondra J., Administrator), to Computerized Tank Testing, Inc. Liquid tank leakage detection system. 4,986,113, Cl. 73-49.200.
Harrison, Steven R.: *See*—
Stults, Robert A.; Harrison, Steven R.; Merrow, Thomas E.; Laursen, Jane J.; Goodman, George O.; Trow, Jay; and Abel, Mark J., 4,987,492, Cl. 358-181.000.
Harsy, Gabor, to SIG Schweizerische Industrie-Gesellschaft. Vehicle, particularly track vehicle. 4,986,190, Cl. 105-4.400.
Hartman, Ernest O.: *See*—
Robinson, Robert; and Hartman, Ernest O., 4,986,217, Cl. 119-168.000.
Hartmann, Dirck T. Chainless motocross bicycle. 4,986,556, Cl. 280-260.000.
Hartmann, Gerhard: *See*—
Sting, Benno; and Hartmann, Gerhard, 4,986,582, Cl. 292-336.300.
Hartmann, Rudolf; Overlach, Knud; and Suchanek, Gunter, to PAT Messtechnik GmbH. Method and apparatus for measuring the configuration of cylinder bores in workpieces. 4,986,004, Cl. 33-555.100.
Hartmann, Uwe; and Ohnemus, Fritz, to Deutsche Thomson-Brandt GmbH. Picture reproduction apparatus with a cathode ray tube and an arrangement for measuring the beam current. 4,987,350, Cl. 315-382.000.
Hartwell Corporation, The: *See*—
Anderson, John P., 4,986,576, Cl. 292-40.000.
Harvey, Donald M., to Eastman Kodak Company. Film frame registration and correction by means of film prerecorded track. 4,987,431, Cl. 354-21.000.
Harvey, Roy. Hydroponic growth system. 4,986,027, Cl. 47-59.000.
Haseler, Helmut: *See*—
Berthold, Werner; Haseler, Helmut; Marx, Paul; Meckl, Heinz; and Ohischlager, Hans, 4,987,059, Cl. 430-428.000.
Hashimoto, Shinichi: *See*—
Imai, Kazuo; Niigata, Kunihiro; Fujikura, Takashi; and Hashimoto, Shinichi, 4,987,152, Cl. 514-603.000.
Hashimoto, Tatsuo: *See*—
Tatematsu, Shinzo; Omata, Kazuki; Hashimoto, Tatsuo; Takahashi, Masato; and Ito, Noriichi, 4,987,031, Cl. 428-402.200.
Hassel, Michael: *See*—
Bizjak, John; Hassel, Michael; and Niemann, David, 4,987,500, Cl. 360-46.000.
Hatada, Naozumi: *See*—
Yasuhara, Toshihiro; Masuda, Masachika; Nishimura, Asao; Hatada, Naozumi; Kawai, Sueo; Kitano, Makoto; Miura, Hideo; Yaguchi, Akihiro; and Murakami, Gen, 4,987,474, Cl. 357-70.000.
Hatakeyama, Kyoe: *See*—
Hirose, Shigeo; Yano, Shoichiro; Hatakeyama, Kyoe; and Nakamura, Kunio, 4,987,213, Cl. 527-301.000.
Hatakoshi, Genichi: *See*—
Ishikawa, Masayuki; Okuda, Hajime; Shiozawa, Hideo; Itaya, Kazuhiko; Watanabe, Yukio; Suzuki, Mariko; and Hatakoshi, Genichi, 4,987,096, Cl. 437-129.000.
Hattler, Brack G. Percutaneous oxygenator. 4,986,809, Cl. 604-26.000.
Hattori, Tadashi: *See*—
Nishida, Minoru; Mizuno, Naohito; Hattori, Tadashi; Huzino, Seizi; and Ando, Yoshiyasu, 4,986,861, Cl. 156-89.000.
Haunberger, Franz: *See*—
Schmidhammer, Ludwig; Hirschmann, Peter; Mohr, Klaus-Peter; Klaus, Hermann; and Haunberger, Franz, 4,986,975, Cl. 423-488.000.
Hauschild, Werner: *See*—
Nitschke, Heinz; and Hauschild, Werner, 4,985,966, Cl. 19-107.000.
Hayakawa, Hiroshi: *See*—
Takahashi, Yutaka; Harashima, Ikuo; Nakayama, Shunichi; Arai, Yasuyuki; Takayanagi, Yasushi; Sekiguchi, Ryoichi; Abe, Tomomitsu; and Hayakawa, Hiroshi, 4,986,448, Cl. 222-129.100.
Hayakawa, Hisashi: *See*—
Kawashima, Kazuki; and Hayakawa, Hisashi, 4,986,796, Cl. 474-101.000.

Hayami, Hiroshi: *See*—
Nowatari, Hiroyoshi; Hayami, Hiroshi; Kuroda, Yasuo; Yoda, Sumio; and Takahashi, Katsutoshi, 4,987,246, Cl. 556-137.000.
Hayashi, Kazunari: *See*—
Hamamoto, Tadanao; Wakiya, Tadashi; and Hayashi, Kazunari, 4,986,646, Cl. 350-637.000.
Hayashi, Kimiyoshi: *See*—
Ikeda, Yoshinori; Yoshida, Tadashi; Hayashi, Kimiyoshi; Abe, Shunichi; Matsuoka, Nobuo; Akiyama, Mitsuo; and Mita, Yoshinobu, 4,987,484, Cl. 358-75.000.
Hayashi, Nobuyuki: *See*—
Kaji, Makoto; and Hayashi, Nobuyuki, 4,987,057, Cl. 430-281.000.
Tomisawa, Yoshiaki; Satou, Tadaji; Hayashi, Nobuyuki; and Miyamae, Yusuke, 4,986,869, Cl. 156-250.000.
Hayashi, Takayuki: *See*—
Itabashi, Yuichi; Hayashi, Takayuki; and Igarashi, Akira, 4,987,117, Cl. 503-200.000.
Hayashi, Yoshinori: *See*—
Iijima, Kenzaburou; Hayashi, Yoshinori; and Nishimura, Seiya, 4,987,040, Cl. 428-694.000.
Iijima, Kenzaburou; and Hayashi, Yoshinori, 4,987,414, Cl. 341-15.000.
Hayashi, Yuzo: *See*—
Ishimaru, Katsutoshi; Shimada, Akira; Teshima, Shinichi; and Hayashi, Yuzo, 4,987,067, Cl. 435-22.000.
Hayashida, Haruo; Kubo, Kouji; Nomura, Ryouichi; and Koyama, Satoru, to Sumitomo Chemical Co., Ltd. Silk-like film. 4,987,191, Cl. 525-227.000.
Hayasi, Tatsuo: *See*—
Honda, Satoshi; Ogawa, Sumitaka; and Hayasi, Tatsuo, 4,987,544, Cl. 364-431.050.
Hayes, Conrad G.: *See*—
Ying, Edwina; and Hayes, Conrad G., 4,987,174, Cl. 524-444.000.
Hayman, Peter A.: *See*—
Chang, Robert H.; and Hayman, Peter A., 4,986,616, Cl. 312-208.000.
Haymond, William D.; Sillett, Roderick J.; and Lukas, Robert M., to Motorola, Inc. Data communication system with prioritized periodic and aperiodic messages. 4,987,571, Cl. 370-85.000.
Hays, Donald F., Jr., to Extrusion Services, Inc. Cutting apparatus for extruded materials. 4,986,155, Cl. 83-222.000.
Hayward Industries, Inc.: *See*—
Tobias, Samuel; and Messinger, Robert M., 4,985,943, Cl. 4-542.000.
Heaston, Bruce A.: *See*—
Disser, Robert J.; Foust, Jeff A.; Lehnhoff, Richard N.; Graham, Donald E.; and Heaston, Bruce A., 4,987,351, Cl. 318-78.000.
Heatter, Merrill: *See*—
Snaper, Alvin A.; and Heatter, Merrill, 4,986,531, Cl. 272-27.00N.
Heerschap, Arend: *See*—
Van Stapele, Reurt P.; Heerschap, Arend; and Den Hollander, Jan A., 4,987,369, Cl. 324-307.000.
Hegner, Gunter: *See*—
Bramkamp, Wilhelm; and Hegner, Gunter, 4,986,768, Cl. 439-680.000.
Heidt, Thomas D.: *See*—
Booth, Roger; and Heidt, Thomas D., 4,986,187, Cl. 104-84.000.
Heim, Frederick L.; Becker, Mark; Dullinger, Craig A.; Gnifkowski, Edward J.; Gohl, Roger M.; and Weber, John D., to Webway Incorporated. Page binding method and machine. 4,986,864, Cl. 156-201.000.
Heiman GmbH: *See*—
Doenges, Gerhard, 4,987,584, Cl. 378-100.000.
Heimann GmbH: *See*—
Achter, Eugen; Duenisch, Ingo; and Lausch, Michael, 4,987,341, Cl. 313-623.000.
Heims, Dirk, to ABG-Werke GmbH. Laying plank for a road finishing machine. 4,986,695, Cl. 404-118.000.
Heinen, Jochen, to Siemens Aktiengesellschaft. Electrically tunable semiconductor laser with ridge waveguide. 4,987,576, Cl. 372-46.000.
Heinrich, Karl: *See*—
Keil, Gunter; Heinrich, Karl; and Klein, Peter, 4,987,215, Cl. 528-329.100.
Keil, Gunter; Heinrich, Karl; and Klein, Peter, 4,987,216, Cl. 528-329.100.
Keil, Gunter; Heinrich, Karl; and Klein, Peter, 4,987,217, Cl. 528-340.000.
Heinz, Donald E.: *See*—
Schultz, David H.; Mattson, Steven W.; and Heinz, Donald E., 4,986,513, Cl. 256-65.000.
Heinz, Gerhard: *See*—
Goerrissen, Heiner; Heinz, Gerhard; Hilt, Albrecht; and Simon, Georg N., 4,987,176, Cl. 524-456.000.
Heinze, Jurgen: *See*—
Jonas, Friedrich; Heywang, Gerhard; Schmidtberg, Werner; Heinze, Jurgen; and Dietrich, Michael, 4,987,042, Cl. 429-213.000.
Held, Kurt, to Siemens Aktiengesellschaft. Electromagnetic protective switching device. 4,987,397, Cl. 335-131.000.
Helena Laboratories Corporation: *See*—
Sarrine, Robert J.; Garsee, Henry A.; Kelley, Charles D.; and Guadagno, Philip A., 4,986,891, Cl. 204-299.00R.
Helfer, Roland: *See*—
Frumholtz, Johnny; and Helfer, Roland, 4,986,061, Cl. 56-6.000.
Heller, Earl A. Single and/or double player pinball machine. 4,986,543, Cl. 273-121.00A.
Heller, Werner H., to Peerless-Winsmith, Inc. Bi-directional spring clutch for reducing worm gear drive. 4,986,400, Cl. 192-26.000.
Helling, Gunter; and Peters, Manfred, to Reel/Frame Agfa-Gevaert Aktiengesellschaft. Heat developable color photographic recording element. 4,987,061, Cl. 430-531.000.
Helt, Dewey E.; and Helt, Johnann. Garment for use in water recreation. 4,986,786, Cl. 441-120.000.
Helt, Johnann: *See*—
Helt, Dewey E.; and Helt, Johnann, 4,986,786, Cl. 441-120.000.
Helwig, Gunter: *See*—
Zahn, Rudolf; Schroeder, Hans W.; Borgwardt, Christian; Braig, Albert; Helwig, Gunter; and Dittrich, Kay, 4,987,425, Cl. 343-853.000.
Hendrickson, I. Glen; and Hansen, Karl A., to Boeing Company, The. Electromagnetic dent remover with tapped work coil. 4,986,102, Cl. 72-56.000.
Hendrix, Loren E.; and Mistrater, Alan B., to Xerox Corporation. Shotting apparatus and process. 4,986,941, Cl. 264-13.000.
Henkel Kommanditgesellschaft auf Aktien: *See*—
Pickens, Carl; and McCurry, Patrick M., 4,987,225, Cl. 536-124.000.
Henkenjohann, Gerda, to Johann Henkenjohann, Firma. Closure openable and closable by a drive for an aperture, such as a door or gate, comprising interhinged slats. 4,986,331, Cl. 160-201.000.
Hennessy, John P.: *See*—
Ashley, Charles R.; Crossman, Russell J.; Hennessy, John P.; and Lahm, William J., 4,986,414, Cl. 206-5.100.
Henschen, Homer E.: *See*—
Beinhaur, Ernest L.; Henschen, Homer E.; McKee, Michael J.; and Pawlikowski, Joseph M., 4,987,283, Cl. 219-85.110.
Hensel, Robert J.; and Staerzl, Richard E., to Burnswick Corporation. Marine shift speed equalizer. 4,986,776, Cl. 440-87.000.
Heraeus Kulzer GmbH: *See*—
Oppawsky, Steffen; and Burckhardt, Holger, 4,987,310, Cl. 250-492.100.
Herbrechtsmeier, Peter; Theis, Jurgen; and Wieners, Gerhard, to Hoechst Aktiengesellschaft. Optical waveguides. 4,986,630, Cl. 350-96.340.
Herbreteau, Roger: *See*—
Galtier, Lucien; Barthelemy, Andre; and Herbreteau, Roger, 4,986,568, Cl. 280-707.000.
Herrin, Bradley T.: *See*—
Craft, Thomas W.; Herrin, Bradley T.; and Ludwig, Thomas E., 4,987,529, Cl. 364-200.000.
Herrington, Thomas L.: *See*—
Nguyen, My N.; Wood, Julie H.; and Herrington, Thomas L., 4,986,849, Cl. 106-1.140.
Herrmann, Gunter: *See*—
Lohr, Hans-Gunter; Herrmann, Gunter; Mozzi, Josef W.; and Claus, Dieter, 4,985,982, Cl. 29-566.001.
Hertel, Hasso; Hunger, Klaus; and Frolich, Heinrich, to Hoechst Aktiengesellschaft. Bisdiazonium salts of 4,4'-diamino-3,3'-dialkoxybiphenyls and a process for their preparation. 4,987,221, Cl. 534-561.000.
Hess, Robert L.: *See*—
Matrak, Edgard; and Hess, Robert L., 4,986,153, Cl. 83-25.000.
Hesterman, Victor W.: *See*—
Gill, Hardayal S.; and Hesterman, Victor W., 4,987,509, Cl. 360-113.000.
Hethcoat, Gary L., to General Dynamics Corporation. Method for cleaning and/or fluxing circuit card assemblies. 4,986,462, Cl. 228-180.100.
Hethcoat, Gary L., to General Dynamics Corp., Air Defense Systems Div. Remote indicator light and safety shield for electrostatic spray gun. 4,986,471, Cl. 239-3.000.
Heuft, Bernhard. Apparatus for controlling the path of transportation of articles. 4,986,407, Cl. 198-367.000.
Heussi, Harold L.: *See*—
Abkowitz, Stanley; Rowell, David M.; Heussi, Harold L.; Ludwig, Harold P.; and Kraus, Stephen A., 4,987,033, Cl. 428-469.000.
Hewitt, Jack, to Middelburg Steel and Alloys (Proprietary) Limited. Hot working and heat treatment of corrosion resistant steels. 4,986,857, Cl. 148-12.0EA.
Hewlett-Packard Company: *See*—
Gailbreath, Samuel H.; Shelton, Boyd N.; and Hilton, Richard L., 4,987,514, Cl. 361-220.000.
Gill, Hardayal S.; and Hesterman, Victor W., 4,987,509, Cl. 360-113.000.
Shreeve, Robert W.; and Atwood, B. Dale, 4,987,365, Cl. 324-158.00F.
Sorin, Wayne V., 4,986,623, Cl. 350-96.150.
Wheeler, Richard L., 4,987,322, Cl. 307-270.000.
Wunderling, Martin; and Rupp, Lothar, 4,987,195, Cl. 525-329.400.
Heywang, Gerhard: *See*—
Jonas, Friedrich; Heywang, Gerhard; Schmidtberg, Werner; Heinze, Jurgen; and Dietrich, Michael, 4,987,042, Cl. 429-213.000.
Hickey, Robert F., to New York State Energy Research and Development Authority. Method of monitoring and/or controlling biologically catalyzed reactions. 4,986,916, Cl. 210-603.000.
Hida, Junichi; Uchida, Naoya; and Tatematsu, Susumu, to Hoshizaki Denki Kabushiki Kaisha. Electric control apparatus for auger type ice making machine. 4,986,081, Cl. 62-130.000.
Hidaka, Yasuhiro; Magami, Masato; Inoue, Takeshi; and Nakane, Sumio, to Yoshitomi Pharmaceutical Industries, Ltd. Biocidal 4,5-dichloro-1,2-dithiol-3-one composition. 4,987,148, Cl. 514-441.000.

Hieb, Larry E.; Petrie, Gregory A.; and Carter, Daniel S., to Vendo Company, The. Vending apparatus. 4,986,615, Cl. 312-45.000.
Hieda, Teruo: *See*—
Imai, Kunio; Homma, Hideo; and Hieda, Teruo, 4,987,482, Cl. 358-41.000.
Higashimoto, Noboru: *See*—
Kobayashi, Taiji; Hosogai, Daijiro; Tsurutani, Kazushi; Higashimoto, Noboru; and Kokubo, Kakuro, 4,986,248, Cl. 123-590.000.
Higashitsuji, Ken; Kimoto, Hiroshi; Takahashi, Yasunobu; Kojima, Teruhisa; and Nadehara, Yutaka, to Marubishi Oil Chemical Co., Ltd. Flame-retardant synthetic resin composition. 4,987,172, Cl. 524-416.000.
Higginbotham, Gordon J. S.: *See*—
Ford, David A.; Higginbotham, Gordon J. S.; Pugh, David R.; and Kumar, Naresh, 4,986,517, Cl. 266-234.000.
Higgins, George D.: *See*—
Bulka, Raymond I.; and Higgins, George D., 4,986,521, Cl. 270-54.000.
Higuchi, Hisayuki: *See*—
Homma, Noriyuki; Higuchi, Hisayuki; Idei, Yoji; Nambu, Hiroaki; and Sakurai, Yoshiaki, 4,986,666, Cl. 365-230.080.
Hijikata, Kenji: *See*—
Nakane, Toshio; Hijikata, Kenji; Iiyama, Makoto; Kageyama, Yukihiko; and Naka, Michirou, 4,987,167, Cl. 524-95.000.
Hiki, Toshimichi: *See*—
Akimoto, Hirofumi; Takeyama, Sadayuki; Hiki, Toshimichi; and Kondo, Masayuki, 4,986,860, Cl. 156-78.000.
Hikosaka, Akihiro; Sakai, Hitoshi; Yoshihara, Takayoshi; and Asakura, Naoichi, to Minolta Camera Kabushiki Kaisha. Image forming apparatus. 4,987,451, Cl. 355-245.000.
Hill, Amos G., to White Consolidated Industries, Inc. Bagger attachment for grass mowers. 4,986,062, Cl. 56-16.900.
Hill-Rom Company, Inc.: *See*—
Foster, L. Dale; and Hornbach, David W., 4,985,946, Cl. 5-60.000.
Hilt, Albrecht: *See*—
Goerrissen, Heiner; Heinz, Gerhard; Hilt, Albrecht; and Simon, Georg N., 4,987,176, Cl. 524-456.000.
Hilti Aktiengesellschaft: *See*—
Hachtel, Hans; Maier, Michael; and Ehmig, Gerhard, 4,986,709, Cl. 411-30.000.
Hilton, Richard L.: *See*—
Gailbreath, Samuel H.; Shelton, Boyd N.; and Hilton, Richard L., 4,987,514, Cl. 361-220.000.
Himmler, Erich, to Kunststoff-Technik AG Himmler. Apparatus for carrying out repair works on a damaged pipeline which a person cannot get through. 4,986,314, Cl. 138-97.000.
Hineno, Makoto: *See*—
Kobayashi, Toshiro; Hiraishi, Hisashi; Hineno, Makoto; Kawata, Tomoshi; Kohara, Yuuji; and Saito, Masaharu, 4,986,181, Cl. 101-348.000.
Hinterreiter, Ignaz. Tablet dispenser. 4,986,442, Cl. 221-229.000.
Hintzer, Klaus: *See*—
Schwertfeger, Werner; Hintzer, Klaus; and Blickle, Peter, 4,987,254, Cl. 562-851.000.
Hirai, Yutaka: *See*—
Takasu, Katsuji; Sano, Masafumi; Tsuda, Hisanori; and Hirai, Yutaka, 4,987,460, Cl. 357-17.000.
Hiraishi, Hisashi: *See*—
Kobayashi, Toshiro; Hiraishi, Hisashi; Hineno, Makoto; Kawata, Tomoshi; Kohara, Yuuji; and Saito, Masaharu, 4,986,181, Cl. 101-348.000.
Hiraki, Tadayoshi: *See*—
Shibata, Terukazu; tominaga, Akira; and Hiraki, Tadayoshi, 4,987,178, Cl. 524-547.000.
Hiraku, Akira: *See*—
Mori, Eiji; Sonoda, Hidefumi; Hiraku, Akira; Minezawa, Morio; Kato, Isao; and Ito, Koichi, 4,986,840, Cl. 55-316.000.
Hirano, Akihiko: *See*—
Naruse, Nobutaka; Hirano, Akihiko; and Minari, Katsunobu, 4,986,083, Cl. 62-157.000.
Hirano, Shigeo; Katoh, Kazunobu; Inagaki, Yoshio; and Inoue, Nobuaki, to Fuji Photo Film Co., Ltd. Silver halide photographic material and method for forming superhigh contrast negative images using the same. 4,987,052, Cl. 430-264.000.
Hirano, Yoshinori: *See*—
Uemura, Masakazu; Hirano, Yoshinori; and Shimonosono, Hitoshi, 4,986,345, Cl. 165-86.000.
Hirao, Motoaki: *See*—
Komeno, Minoru; Hirao, Motoaki; Takeuchi, Toshiyuki; Nozoe, Shunpei; Takano, Hideki; and Yoshida, Katsunori, 4,986,199, Cl. 110-347.000.
Hiraoka, Toyoki: *See*—
Ishii, Akira; Terui, Takashi; Hiraoka, Toyoki; and Murakami, Yuichi, 4,986,235, Cl. 123-195.00C.
Hirata, Atsushi: *See*—
Fukase, Hisahiko; Matsui, Kunio; Nomura, Akihiro; and Hirata, Atsushi, 4,986,336, Cl. 164-415.000.
Hirata, Minoru: *See*—
Tsushima, Susumu; Takatani, Muneo; and Hirata, Minoru, 4,987,130, Cl. 514-210.000.
Hirata, Yoichi: *See*—
Yanagisawa, Koichi; and Hirata, Yoichi, 4,986,120, Cl. 73-155.000.
Hirata, Yoshimi: *See*—
Kaneko, Noriaki; Hirata, Yoshimi; and Moriwaki, Masahiro, 4,986,832, Cl. 623-1.000.
Hirayama, Hiroyuki: *See*—
Ebata, Shuji; Hirayama, Hiroyuki; and Uchiyama, Takako, 4,987,256, Cl. 564-126.000.
Hiroi, Masakazu: *See*—
Shido, Hironori; Saito, Jun; Hiroi, Masakazu; Kobayashi, Kenji; Murakami, Koichi; Naito, Masataka; and Honjo, Takeshi, 4,986,520, Cl. 270-53.000.
Hirose, Kenichi; and Ichikawa, Tadao, to Nihon Kaiheiki Industrial Company, Ltd. Display button of push-button switch. 4,987,279, Cl. 200-314.000.
Hirose, Shigeo; Yano, Shoichiro; Hatakeyama, Kyoe; and Nakamura, Kunio, to Director-General of Agency of Industrial Science and Technology. Polyurethane and process for preparing same. 4,987,213, Cl. 527-301.000.
Hirota, Yoshihiko, to Minolta Camera Kabushiki Kaisha. Image reading apparatus with improved output correction of image signal. 4,987,485, Cl. 358-80.000.
Hirschmann, Peter: *See*—
Schmidhammer, Ludwig; Hirschmann, Peter; Mohr, Klaus-Peter; Klaus, Hermann; and Haunberger, Franz, 4,986,975, Cl. 423-488.000.
Hirth, Michael; Jochum, Joachim; and Wieckert, Christian, to Asea Brown Boveri Ltd. Scraper. 4,986,347, Cl. 165-94.000.
Hirth, Michael; and Mechtersheimer, Gunter, to Asea Brown Boveri Limited. Ozone generator. 4,986,968, Cl. 422-186.190.
Hitachi Automotive Engineering Co., Ltd.: *See*—
Usui, Toshifumi; and Hohkita, Atsushi, 4,986,116, Cl. 73-118.200.
Hitachi Chemical Co., Ltd.: *See*—
Kaji, Makoto; and Hayashi, Nobuyuki, 4,987,057, Cl. 430-281.000.
Kobayashi, Akihiro; Fujita, Toshiyuki; Saito, Takayuki; Kawai, Hiromasa; Hosoi, Yutaka; and Shibata, Hideaki, 4,986,648, Cl. 351-160.00R.
Tomisawa, Yoshiaki; Satou, Tadaji; Hayashi, Nobuyuki; and Miyamae, Yusuke, 4,986,869, Cl. 156-250.000.
Yamamoto, Hiroshi; Shimazaki, Takeshi; and Kuramochi, Kazuichi, 4,986,848, Cl. 106-1.110.
Hitachi Construction Machinery Co., Ltd.: *See*—
Yamada, Kazuyoshi; Kashiwagi, Kunio; and Kurenuma, Tooru, 4,987,356, Cl. 318-578.000.
Hitachi Device Engineering Co., Ltd.: *See*—
Homma, Noriyuki; Higuchi, Hisayuki; Idei, Yoji; Nambu, Hiroaki; and Sakurai, Yoshiaki, 4,986,666, Cl. 365-230.080.
Hitachi, Ltd.: *See*—
Daimon, Hideo; Kitakami, Osamu; and Fujiwara, Hideo, 4,987,039, Cl. 428-694.000.
Haikawa, Katsumasa, 4,986,958, Cl. 376-419.000.
Hamada, Tomoyuki; Kamezima, Kohzi; Takeuchi, Ikuo; and Watanabe, Yuriko, 4,987,527, Cl. 364-167.010.
Homma, Noriyuki; Higuchi, Hisayuki; Idei, Yoji; Nambu, Hiroaki; and Sakurai, Yoshiaki, 4,986,666, Cl. 365-230.080.
Kobayashi, Junichi; and Mizumori, Takashi, 4,986,244, Cl. 123-488.000.
Koseki, Yasuo; Yamada, Akira; Kurokawa, Hideaki; Ohkouchi, Isao; Ebara, Katsuya; and Takahashi, Sankichi, 4,986,079, Cl. 62-59.000.
Nishikado, Takashi; Kondo, Megumu; and Murata, Fumiya, 4,987,531, Cl. 364-200.000.
Saho, Norihide; Nemoto, Takeo; and Shizuoka, Yoshihide, 4,986,077, Cl. 62-51.100.
Satoh, Yasuo; and Kobayashi, Tohru, 4,987,326, Cl. 307-465.000.
Sekine, Yoshihito; Arai, Nobukatsu; Osawa, Tadao; Tokuda, Hiroatsu; Usui, Toshifumi; and Tsutsui, Mitsukuni, 4,986,115, Cl. 73-118.200.
Setoyama, Eiji; and Kamei, Mitsuhiro, 4,986,890, Cl. 204-298.060.
Shimada, Satoshi; Ugai, Seiichi; Sase, Akira; and Shimizu, Yasushi, 4,986,127, Cl. 73-714.000.
Shinada, Sigeo; Fujita, Hiroyuki; and Nagata, Yoichi, 4,987,568, Cl. 370-15.000.
Tachi, Shinichi; Tsujimoto, Kazunori; and Okudaira, Sadayuki, 4,986,877, Cl. 156-643.000.
Usui, Toshifumi; and Hohkita, Atsushi, 4,986,116, Cl. 73-118.200.
Yasuhara, Toshihiro; Masuda, Masachika; Nishimura, Asao; Hatada, Naozumi; Kawai, Sueo; Kitano, Makoto; Miura, Hideo; Yaguchi, Akihiro; and Murakami, Gen, 4,987,474, Cl. 357-70.000.
Hitachi, Ltd: *See*—
Ishikawa, Yuichi; Yoshimura, Toshihiko; Shimizu, Tasuku; Otaka, Masahiro; and Takaku, Kazuo, 4,987,367, Cl. 324-227.000.
Hitachi, Yuzo; and Takikawa, Kazunori, to Usui Kokusai Sangyo Kabushiki Kaisha. High-efficiency metal-made carrier body for exhaust gas cleaning catalyst. 4,987,034, Cl. 428-593.000.
Hodogaya Chemical Co., Ltd.: *See*—
Kazuyuki, Wakasugi; Kikkawa, Katsumasa; Yamaguchi, Masahiko; and Motohashi, Katsuichi, 4,987,262, Cl. 564-443.000.
Hoechst AG: *See*—
Becker, Wilhelm; Godau, Claus; and Dreischhoff, Dieter, 4,987,163, Cl. 523-414.000.
Hoechst Aktiengesellschaft: *See*—
Zerfass, Karl-Christian; Kaulich, Franz; Schops, Michael; Wagner, Hans; and Weiter, Bertrand C., 4,987,027, Cl. 428-287.000.
Hoechst Aktiengesellschaft: *See*—
Dietz, Erwin; Munkel, Albert; and Memmel, Ferdinand, 4,986,851, Cl. 106-503.000.
Dietz, Erwin; Kapaun, Gustav; Kappert, Michael; Prokschy, Frank; Kroh, Adolf; and Urban, Manfred, 4,986,852, Cl. 106-498.000.

Driscoll, Robert K.; Leupold, Ingo; and Schonwalder, Karl-Heinz, 4,986,885, Cl. 203-73.000.
Fischer, Hartmut, 4,987,234, Cl. 548-305.000.
Gersdorf, Joachim; and Rose, Klaus, 4,987,053, Cl. 430-277.000.
Herbrechtsmeier, Peter; Theis, Jurgen; and Wieners, Gerhard, 4,986,630, Cl. 350-96.340.
Hertel, Hasso; Hunger, Klaus; and Frolich, Heinrich, 4,987,221, Cl. 534-561.000.
Hunger, Klaus; Frolich, Heinrich; and Habig, Kurt C., 4,987,258, Cl. 564-309.000.
Keil, Gunter; Heinrich, Karl; and Klein, Peter, 4,987,215, Cl. 528-329.100.
Keil, Gunter; Heinrich, Karl; and Klein, Peter, 4,987,216, Cl. 528-329.100.
Keil, Gunter; Heinrich, Karl; and Klein, Peter, 4,987,217, Cl. 528-340.000.
Lendle, Wilhelm; Scheibitz, Wolfgang; Tetzlaff, Heribert; and Wojtech, Bernhard, 4,986,974, Cl. 423-488.000.
Rode, Klaus; Mohr, Dieter; Frass, Werner; and Gersdorf, Joachim, 4,987,055, Cl. 430-277.000.
Rohrscheid, Freimund, 4,987,238, Cl. 549-241.000.
Schwertfeger, Werner; Hintzer, Klaus; and Blickle, Peter, 4,987,254, Cl. 562-851.000.

Hoechst Celanese Corporation: *See*—
Irby, Richard E.; Kyker, G. Stephen; DiSano, Lorenzo P.; and Alvarez, Eduardo, 4,986,511, Cl. 251-1.300.
Ying, Edwina; and Hayes, Conrad G., 4,987,174, Cl. 524-444.000.

Hoeltje, Dagmar; and Thielke, Dietrich, to Beecham Wuelfing GmbH & Co., KG. Certain 6,7,8,9-tetrahydropyrido[1,2-α]indoles and their use for the treatment of cerbrovascular disorders. 4,987,137, Cl. 514-294.000.

Hoffman, Eugene, to Drackett Company, The. Thickened alkali metal hypochlorite compositions. 4,986,926, Cl. 252-102.000.

Hoffman, Herwig: *See*—
Bott, Kaspar; Hoffman, Herwig; and Scheidmeir, Walter, 4,987,270, Cl. 568-905.000.

Hoffman, Peter: *See*—
Knapp, Hubert; and Hoffman, Peter, 4,986,847, Cl. 75-525.000.

Hoffmann, Hans-Jurgen, to Schott Glaswerke. Method for the production of cylindrically symmetric bodies with a radial gradient. 4,986,939, Cl. 264-1.700.

Hofle, Gerhard: *See*—
Bohlendorf, Bettina; Bedorf, Norbert; Hofle, Gerhard; Schummer, Dietmar; and Sutter, Marius, 4,987,149, Cl. 514-450.000.
Reichenbach, Hans; Hofle, Gerhard; Augustiniak, Hermann; Bedorf, Norbert; Gerth, Klaus; Irschik, Herbert; Jansen, Rolf; Kunze, Brigitte; Schomburg, Dietmar; Steinmetz, Heinrich; Trowitzsch-Kienast, Wolfram; and Wray, Victor, 4,987,072, Cl. 435-119.000.

Hofmann, Heinrich; and Troster, Manfred, to FAG Kugelfischer Georg Schafer (KGaA). Wheel mount for driven wheels. 4,986,607, Cl. 301-124.00R.

Hoglund, Nils G., to Aktiebolaget Br. Hoglunds Maskinuthyrning. Machine for corrugating sheet metal or the like. 4,986,105, Cl. 72-180.000.

Hoglund, Ronny: *See*—
Gullichsen, Johan; Nilsson, Bengt; and Hoglund, Ronny, 4,986,480, Cl. 241-28.000.

Hohkita, Atsushi: *See*—
Usui, Toshifumi; and Hohkita, Atsushi, 4,986,116, Cl. 73-118.200.

Hokkai Can Co., Ltd.: *See*—
Shinomiya, Tsutomu, 4,986,731, Cl. 414-798.900.

Hokuko Sangyou Limited Responsibility Company: *See*—
Nakamura, Yoshio, 4,987,349, Cl. 318-293.000.

Hollister Incorporated: *See*—
Schneider, Barry L., 4,986,815, Cl. 604-180.000.

Holloran, Robert: *See*—
Preston, Stuart; Holloran, Robert; and Lidgate, Brian, 4,986,553, Cl. 277-152.000.

Hollstein, Thomas E.; Keefer, Larry W.; Fulkerson, Terrence M.; and Gray, Kenneth W., to Nordson Corporation. Apparatus for coating pipe threads. 4,986,210, Cl. 118-629.000.

Holmes, Gerald E.; and Cannon, Fleming V., Jr., to Century Wrecker Corporation. Quick connect/disconnect wheel cradle arrangement for wheel lift towing systems. 4,986,720, Cl. 414-563.000.

Holmes, William K.; and Joneikis, Albert E., to Cushion Cut, Inc. Chain saw cutting assembly. 4,986,252, Cl. 125-21.000.

Holoch, Jan; Peter, Roland; Eisenbarth, Philipp; and Allspach, Thomas, to BASF Aktiengesellschaft. Novel polyphenol and thermosetting plastics prepared therefrom. 4,987,264, Cl. 568-33.000.

Holoubek, Andrew J.: *See*—
McCann, Gerald P.; and Holoubek, Andrew J., 4,986,447, Cl. 222-129.100.

Holte, James E.: *See*—
Preves, David A.; Rosengren, Brian P.; Holte, James E.; and Leonard, Myer S., 4,986,281, Cl. 128-782.000.

Holweg, Hermanus A. C., to Volvo Car B.V. Transmission chain with pivot pins and intermediate pieces with rolling contact action. 4,986,799, Cl. 474-240.000.

Holzer, Walter. Fine gold articles. 4,987,038, Cl. 428-672.000.

Homma, Hideo: *See*—
Imai, Kunio; Homma, Hideo; and Hieda, Teruo, 4,987,482, Cl. 358-41.000.

Homma, Noriyuki; Higuchi, Hisayuki; Idei, Yoji; Nambu, Hiroaki; and Sakurai, Yoshiaki, to Hitachi Device Engineering Co., Ltd.; and Hitachi Ltd. Semiconductor memory device. 4,986,666, Cl. 365-230.080.

Honda Giken Kogyo Kabushiki Kaisha: *See*—
Honda, Satoshi; Ogawa, Sumitaka; and Hayasi, Tatsuo, 4,987,544, Cl. 364-431.050.
Kubo, Kanji; and Mitobe, Keiichi, 4,986,567, Cl. 280-690.000.
Tozune, Sigeru; Yamazaki, Shizuo; Komori, Ryuichi; Ishii, Masashi; Sakaguchi, Yoshio; and Oda, Tetsuya, 4,987,156, Cl. 521-99.000.
Yagi, Nagatada; Shiraishi, Motoatsu; Kimura, Shizuo; Watano, Yukihisa; Nakamura, Mitsuki; and Shinozawa, Shinji, 4,985,993, Cl. 29-894.353.

Honda, Satoshi; Ogawa, Sumitaka; and Hayasi, Tatsuo, to Honda Giken Kogyo Kabushiki Kaisha. Engine control device for reducing the processing time of control variables. 4,987,544, Cl. 364-431.050.

Honeywell Inc.: *See*—
Kude, William B., 4,986,184, Cl. 102-256.000.

Honjo, Takeshi: *See*—
Shido, Hironori; Saito, Jun; Hiroi, Masakazu; Kobayashi, Kenji; Murakami, Koichi; Naito, Masataka; and Honjo, Takeshi, 4,986,520, Cl. 270-53.000.

Hoogovens Groep B.V.: *See*—
Praat, Cornelis N. A.; and Veld, Lambertus, 4,986,749, Cl. 432-28.000.

Hook, Brenda J.: *See*—
Adams, Earl G.; Bayer, Arthur C.; Farmer, Alan D.; and Hook, Brenda J., 4,986,917, Cl. 210-634.000.
Adams, Earl G.; Bayer, Arthur C.; Farmer, Alan D.; and Hook, Brenda J., 4,986,920, Cl. 210-710.000.

Hooper, Fred V. Fastener means for pacifiers, toys, badges and like articles. 4,985,968, Cl. 24-302.000.

Hopkins, James R.; and Strachan, Brian, to Canada, Atomic Energy of, Ltd. Composite pressure vessel for a nuclear environment. 4,986,112, Cl. 73-49.200.

Hopkinson, Philip J.; and Mayall, George W., to Cooper Industries, Inc. Gapped arrester. 4,987,511, Cl. 361-35.000.

Hopwood, Anthony L, to Ilford Limited. Method of preparing a color hologram suitable for display purposes. 4,987,479, Cl. 358-3.000.

Hori, Hideya: *See*—
Nakamura, Mamoru; and Hori, Hideya, 4,987,399, Cl. 336-192.000.

Hori, Nobuo: *See*—
Yokokura, Takashi; Hori, Nobuo; Shimozono, Hiroaki; and Niimura, Satoru, 4,986,653, Cl. 356-5.000.

Hori, Taizou, to Canon Kabushiki Kaisha. Amplifying device. 4,987,501, Cl. 360-64.000.

Horikawa, Kazuo; Miyagawa, Ichirou; and Okada, Kouichi, to Fuji Photo Film Co., Ltd. Beam-combining laser beam source device. 4,986,634, Cl. 350-174.000.

Horn, Allen F., III: *See*—
Miller, Terry L.; Zdanis, William R., Jr.; Woerner, Graham A.; and Horn, Allen F., III, 4,987,274, Cl. 174-102.00R.

Horn, Daniel T. Tool holder for a screw machine box tool. 4,986,151, Cl. 82-157.000.

Hornbach, David W.: *See*—
Foster, L. Dale; and Hornbach, David W., 4,985,946, Cl. 5-60.000.

Horng, Alex. Non-brush D.C. motor with an improved stator. 4,987,331, Cl. 310-254.000.

Hornsleth, Steen: *See*—
Blohm, Knud; and Hornsleth, Steen, 4,987,546, Cl. 364-474.300.

Hosaka, Kunio: *See*—
Matsuoko, Yoshiyuki; Hosaka, Kunio; Takeda, Shigefumi; and Mitsuhashi, Hiroshi, 4,987,240, Cl. 549-436.000.

Hoshinouchi, Susumu: *See*—
Zumoto, Nobuyuki; Takahama, Toru; Hoshinouchi, Susumu; and Morita, Noriko, 4,986,214, Cl. 118-722.000.

Hoshizaki Denki Kabushiki Kaisha: *See*—
Hida, Junichi; Uchida, Naoya; and Tatematsu, Susumu, 4,986,081, Cl. 62-130.000.
Naruse, Nobutaka; Hirano, Akihiko; and Minari, Katsunobu, 4,986,083, Cl. 62-157.000.

Hosogai, Daijiro: *See*—
Kobayashi, Taiji; Hosogai, Daijiro; Tsurutani, Kazushi; Higashimoto, Noboru; and Kokubo, Kakuro, 4,986,248, Cl. 123-590.000.

Hosoi, Mitsugu, to Diafoil Company, Limited. Apparatus for preparing polymer film. 4,986,746, Cl. 425-224.000.

Hosoi, Yutaka: *See*—
Kobayashi, Akihiro; Fujita, Toshiyuki; Saito, Takayuki; Kawai, Hiromasa; Hosoi, Yutaka; and Shibata, Hideaki, 4,986,648, Cl. 351-160.00R.

Hosten, Daniel; and Floegel, Lothar, to Siemens Aktiengesellschaft. Electroplating apparatus for plate-shaped workpieces. 4,986,888, Cl. 204-198.000.

Houki, Yoji: *See*—
Watarai, Shinichi; Houki, Yoji; and Nonomura, Tomohiro, 4,986,528, Cl. 271-265.000.

Hour, Tyh-Yuan. Cleaning sprayers with a spraying-angle adjusting device. 4,986,476, Cl. 239-227.000.

Howard, Durvyn M. Knife with blade lock. 4,985,998, Cl. 30-158.000.

Howard, James W., to Digital Equipment Corporation. Method and apparatus for detecting focus and tracking errors. 4,987,292, Cl. 250-201.500.

Howe Furniture Corporation: *See*—
Diffrient, Niels, 4,986,195, Cl. 108-150.000.

Hryckowian, Eugene, deceased: *See*—
Zeto, Robert J.; Hryckowian, Eugene, deceased; Morton, David C.; Costello, John A.; and Conrad, John C., 4,986,876, Cl. 156-643.000.
Hsu, Fu-Chieh; Wong, Chun-Chiu D.; and Hanrahan, Ciaran P., to Integrated Device Technology, Inc. Static ram cell with trench pul-down transistors and buried-layer ground plate. 4,987,090, Cl. 437-52.000.
Hsu, Ming-ta S.: *See*—
Riccitiello, Salvatore R.; Hsu, Ming-ta S.; and Chen, Timothy S., 4,987,201, Cl. 528-4.000.
Hsu, Nick. Structure of stationery case. 4,986,417, Cl. 206-214.000.
Hubbell Incorporated: *See*—
Gansale, Robert C., 4,986,372, Cl. 174-106.0SC.
Huck, Francis: *See*—
Braedle, Gilbert; Cromer, Paul; and Huck, Francis, 4,986,806, Cl. 493-468.000.
Hudspeth, William, to Polaroid Corporation. Compact hand-held apparatus for copying an illuminated image. 4,987,441, Cl. 355-50.000.
Huels Aktiengesellschaft: *See*—
Disteldorf, Josef; Haage, Hans-Jurgen; Libera, Hubert; and Kirchner, Peter, 4,986,932, Cl. 252-403.000.
Rauleder, Hartwig; Kotzsch, Hans-Joachim; and Vahlensieck, Hans-Joachim, 4,987,268, Cl. 568-616.000.
Hughes Aircraft Company: *See*—
Chang, David B.; and Pierce, Brian M., 4,986,639, Cl. 350-354.000.
Webster, Jackie R.; Pearson, Keith V.; Chang, David B.; Moise, Norton L.; and Vali, Victor, 4,987,582, Cl. 378-85.000.
Hughes, John B., to U.S. Philips Corporation. Operational amplifier circuit. 4,987,379, Cl. 330-253.000.
Hughes, John L., to Australian Electro Optics Pty Ltd. Frequency shifted laser transmitter. 4,987,376, Cl. 330-4.300.
Hula, Emil; and Deyer, Johann, to Maschinenfabrik Andritz Actiengesellschaft. Apparatus and process for the surface treatment of strips with liquids. 4,986,291, Cl. 134-122.00R.
Hull, Harold L.; and Waite, Dennis J. Variable weight exercise device. 4,986,535, Cl. 272-117.000.
Humblet, Pierre A., to Codex Corporation. Communication system for sending an identical routing tree to all connected nodes to establish a shortest route and transmitting messages thereafter. 4,987,536, Cl. 364-200.000.
Humphrey Engineering, Inc.: *See*—
Humphrey, John M., 4,986,561, Cl. 280-605.000.
Humphrey, John M., to Humphrey Engineering, Inc. Method and apparatus for speed and maneuverability control for downhill skiing. 4,986,561, Cl. 280-605.000.
Hunger, Klaus; Frolich, Heinrich; and Habig, Kurt C., to Hoechst Aktiengesellschaft. 4,4'-diaminodiphenyl compounds, process for their preparation and their use. 4,987,258, Cl. 564-309.000.
Hunger, Klaus: *See*—
Hertel, Hasso; Hunger, Klaus; and Frolich, Heinrich, 4,987,221, Cl. 534-561.000.
Hunnicutt, Clyde J., Jr. Beverage brewing apparatus. 4,986,172, Cl. 99-306.000.
Hur, Kyoung M. Cap visor containing display means. 4,985,935, Cl. 2-209.100.
Hurley, Ralph J.: *See*—
Beck, Arnold A.; Ruof, Edgar J.; Nedelk, John; Hurley, Ralph J.; and Smithberger, Steven R., 4,986,610, Cl. 303-93.000.
Hurley, Terry R.; and Nishio, Naoki, to Sony Corporation. Apparatus for generating an interlaced slow motion video output signal by spatial and temporal interpolation. 4,987,489, Cl. 358-105.000.
Huron Products Corporation: *See*—
Gute, Robert M., 4,986,312, Cl. 138-45.000.
Husky Injection Molding Systems Ltd.: *See*—
Bertschi, Rene, 4,986,944, Cl. 264-40.500.
Hutchins, Clinton E.; Kuzia, Eugene W.; Schmidt, Phyllis M.; and Schroeder, Walter W., to Sprague Electric Company. Hermetically sealed aluminum electrolytic capacitor. 4,987,519, Cl. 361-518.000.
Hutchins, Donald H., to Hutchins Manufacturing Company. Abrading or polishing tool. 4,986,036, Cl. 51-170.00R.
Hutchins Manufacturing Company: *See*—
Hutchins, Donald H., 4,986,036, Cl 51-170.00R.
Hutchinson: *See*—
Bellamy, Alain; and Chauvet, Ludovic, 4,986,510, Cl. 248-562.000.
Huzino, Seizi: *See*—
Nishida, Minoru; Mizuno, Naohito; Hattori, Tadashi; Huzino, Seizi; and Ando, Yoshiyasu, 4,986,861, Cl. 156-89.000.
Hwang, Chiman. Refillable ink ribbon cartridge for use in an electronic typewriter. 4,986,678, Cl. 400-208.000.
Hydro Data Inc.: *See*—
Gust, Giselher R., 4,986,122, Cl. 73-204.150.
Hydro Soil Services: *See*—
Bernard, Alain; and Stordiau, Marc, 4,986,203, Cl. 114-51.000.
Hydromer, Inc.: *See*—
Creasy, Walter S., 4,987,182, Cl. 525-57.000.
Hyodo, Toru; and Sasano, Akiyoshi, to Janome Sewing Machine Company Limited. Sewing machine capable of setting a fabric feed to zero at the beginning of sewing operation. 4,986,201, Cl. 112-456.000.
Iams, John F.; and Splane, Robson L., Jr., to Superspine, Inc. Apparatus and method for providing continuous passive motion to the spine. 4,986,260, Cl. 128-24.00R.
Iams, John F.; and Splane, Robson L., Jr., to Superspine, Inc. Apparatus for performing coordinated walking motions with the spine in an unloaded state. 4,986,261, Cl. 128-25.00R.
Ibsen, Robert L.: *See*—
Glace, William R.; and Ibsen, Robert L., 4,986,981, Cl. 424-50.000.
Ichikawa, Hiroshi: *See*—
Aoki, Kunimitsu; Miyazawa, Yasuhiro; Ichikawa, Hiroshi; and Furuya, Yoshiyuki, 4,986,631, Cl. 350-112.000.
Ichikawa, Tadao: *See*—
Hirose, Kenichi; and Ichikawa, Tadao, 4,987,279, Cl. 200-314.000.
Ichimura, Katsuhiko: *See*—
Saito, Keiji; Ichimura, Katsuhiko; and Tajima, Takahiro, 4,987,548, Cl. 364-498.000.
Ichinose, Makoto: *See*—
Fukushima, Yoshihisa; Satoh, Isao; Ichinose, Makoto; Kuroki, Yuzuru; and Takagi, Yuuji, 4,986,668, Cl. 369-59.000.
Ichinose, Susumu; Tetsutani, Nobuji; and Ishibashi, Morito, to Nippon Telegraph and Telephone Corporation. Method of stereoscopic images display which compensates electronically for viewer head movement. 4,987,487, Cl. 358-92.000.
Ideal Industries, Inc.: *See*—
Finn, Jerome W., 4,985,991, Cl. 29-878.000.
Idei, Yoji: *See*—
Homma, Noriyuki; Higuchi, Hisayuki; Idei, Yoji; Nambu, Hiroaki; and Sakurai, Yoshiaki, 4,986,666, Cl. 365-230.080.
Idemitsu Petrochemical Co., Ltd.: *See*—
Nomura, Manabu; Tomomatsu, Ryuzo; and Kihara, Kazuaki, 4,987,173, Cl. 524-423.000.
Iesaka, Mamoru: *See*—
Shibata, Hidenori; Iesaka, Mamoru; and Oosawa, Shinji, 4,987,466, Cl. 357-24.000.
Igarashi, Akira: *See*—
Itabashi, Yuichi; Hayashi, Takayuki; and Igarashi, Akira, 4,987,117, Cl. 503-200.000.
Iida, Hidekazu: *See*—
Ohata, Hiroyuki; Tanaka, Masaki; Ohashi, Hiroshi; Suemoto, Kiyoji; Iida, Hidekazu; and Saga, Hiroshi, 4,987,180, Cl. 524-860.000.
Iida, Takafumi: *See*—
Kurono, Masayasu; Yamakawa, Hidehumi; Koshizaka, Takuya; Suzuki, Takehiko; Kato, Eiichi; Iida, Takafumi; Ohishi, Nobuko; and Yagi, Kunio, 4,987,150, Cl. 514-455.000.
Iijima, Kenzaburou; Hayashi, Yoshinori; and Nishimura, Seiya, to Yamaha Corporation. Magnetic recording medium for displacement detectors. 4,987,040, Cl. 428-694.000.
Iijima, Kenzaburou; and Hayashi, Yoshinori, to Yamaha Corporation. Signal processing circuit for an encoder. 4,987,414, Cl. 341-15.000.
Iio, Keiji: *See*—
Ishida, Yuzuru; Mitsuboshi, Masahiro; Inoue, Haruo; Otsuka, Ichiro; and Iio, Keiji, 4,987,170, Cl. 524-267.000.
Iiyama, Katsuaki: *See*—
Ohta, Masahiro; Kawashima, Saburo; Iiyama, Katsuaki; Tamai, Shoji; Oikawa, Hideaki; and Yamaguchi, Akihiro, 4,987,197, Cl. 525-436.000.
Iiyama, Makoto: *See*—
Nakane, Toshio; Hijikata, Kenji; Iiyama, Makoto; Kageyama, Yukihiko; and Naka, Michirou, 4,987,167, Cl. 524-95.000.
Iizuka, Taiji: *See*—
Fukuma, Yoshitaka; and Iizuka, Taiji, 4,987,588, Cl. 379-98.000.
Ikado, Shuhei: *See*—
Izukawa, Tsukuru; Ikado, Shuhei; and Enomoto, Toshiyuki, 4,987,198, Cl. 525-491.000.
Ikeda Bussan Co., Ltd.: *See*—
Suzuki, Takami; Chinomi, Isamu; Tanaka, Yuji; and Kuwabara, Isao, 4,986,509, Cl. 248-396.000.
Ikeda Bussan Co., Ltd: *See*—
Fujii, Masanobu, 4,986,865, Cl. 156-214.000.
Ikeda, Hideo: *See*—
Kajiwara, Kenichi; Mori, Kikuichi; and Ikeda, Hideo, 4,986,736, Cl. 416-181.000.
Sato, Hiroshi; Utsui, Yoshihiko; Ikeda, Hideo; and Hamamura, Chiyo, 4,986,137, Cl. 73-862.360.
Ikeda, Kiyosi: *See*—
Takao, Hiroyoshi; Yoshida, Nobuyuki; Ikeda, Kiyosi; and Fukuyama, Masahiro, 4,987,199, Cl. 525-327.300.
Ikeda, Naoki: *See*—
Ishii, Koji; and Ikeda, Naoki, 4,986,176, Cl. 101-148.000.
Ikeda, Tadashi: *See*—
Saitou, Mitsuo; Ukai, Toshinao; and Ikeda, Tadashi, 4,987,064, Cl. 430-570.000.
Ikeda, Yoshinori; Yoshida, Tadashi; Hayashi, Kimiyoshi; Abe, Shunichi; Matsuoka, Nobuo; Akiyama, Mitsuo; and Mita, Yoshinobu, to Canon Kabushiki Kaisha. Halftone image signal processing apparatus in which pixels of a dither threshold pattern are each divided into an operator-selected number of micropixels. 4,987,484, Cl. 358-75.000.
Ikegame, Tetsuo, to Olympus Optical Co., Ltd. Apparatus for driving objective lens. 4,987,565, Cl. 369-44.150.
Ikegami, Yuji: *See*—
Koshiba, Yoshikazu; Ikegami, Yuji; Tachino, Noboru; and Kamiya, Takeshi, 4,987,000, Cl. 427-11.000.
Ikegawa, Akihito: *See*—
Nakagawa, Shuichi; Murasaki, Hiroshi; Ikegawa, Akihito; Etou, Kouichi; and Mizuno, Hiroshi, 4,987,452, Cl. 355-245.000.
Ikegaya, Isao; Matsumoto, Tadashi; and Sugimoto, Kunihisa, to Fujikiko Kabushiki Kaisha. Seat reclining device. 4,986,514, Cl. 297-362.000.
Ikeno, Masahiko, to Mitsubishi Denki Kabushiki Kaisha. Solid state imaging device. 4,987,477, Cl. 357-75.000.

Ilford Limited: *See*—
Hopwood, Anthony I., 4,987,479, Cl. 358-3.000.
Imaeda, Hirofumi, to Sanshin Kogyo Kabushiki Kaisha. Current switching device for motor. 4,987,353, Cl. 318-293.000.
Imahase, Tomotoshi: *See*—
Kisida, Hiroi; Shuto, Akira; Tamaki, Masahiro; Imahase, Tomotoshi; and Fujimoto, Hiroaki, 4,987,145, Cl. 514-394.000.
Imahashi, Satoshi; Saito, Atsushi; and Yamashita, Katuhiro, to Toyo Boseki Kabushiki Kaisha. Photopolymerizable composition. 4,987,056, Cl. 430-281.000.
Imai, Isao: *See*—
Ishii, Toshitsuga; Imai, Isao; Sano, Akira; and Sueyoshi, Kouichi, 4,986,972, Cl. 423-344.000.
Imai, Kazuo; Niigata, Kunihiro; Fujikura, Takashi; and Hashimoto, Shinichi, to Yamanouchi Pharmaceutical Co., Ltd. Use of sulfamoyl-substituted phenethylamine derivatives in treatment of lower urinary tract dysfunction. 4,987,152, Cl. 514-603.000.
Imai, Kunio; Homma, Hideo; and Hieda, Teruo, to Canon Kabushiki Kaisha. Image pickup apparatus having exposure control for human subjects. 4,987,482, Cl. 358-41.000.
Imato, Shinji: *See*—
Yamazaki, Shunpei; Urata, Kazuo; Tashiro, Mamoru; Tanamura, Yuji; and Imato, Shinji, 4,987,008, Cl. 427-53.100.
Imatou, Shinji: *See*—
Yamazaki, Shunpei; Tsuchiya, Mitsunori; Kawano, Atsushi; Imatou, Shinji; Nakashita, Kazuhisa; Hamatani, Toshiji; Inushima, Takashi; and Itou, Kenji, 4,987,004, Cl. 427-38.000.
Imbert, Claude; Jouet, Jean M.; and Carre, Patrick, to Becton, Dickinson and Company. Syringe assembly. 4,986,818, Cl. 604-192.000.
Imperial Chemical Industries PLC: *See*—
Bushell, Michael J.; Carr, Robin A. E.; Moseley, Donn W.; and Sillars, Nan C., 4,987,141, Cl. 514-346.000.
Oliver, Raymond; Smith, Jeremy G. B.; and Villamagna, Fortunato, 4,986,858, Cl. 149-109.600.
Imperial, William A. Landscape apparatus. 4,986,025, Cl. 47-2.000.
INA Walzlager Schaeffler KG: *See*—
Neuwirth, Ernst; Rabe, Jurgen; and Ritter, Joachim, 4,986,402, Cl. 192-45.000.
Inaba, Toshiaki: *See*—
Tanigawa, Toru; Kurihara, Masaaki; Fujii, Yasuji; and Inaba, Toshiaki, 4,986,856, Cl. 148-11.50C.
Inagaki, Junichi: *See*—
Masuda, Sadakazu; Fujita, Fumio; Kamata, Masamoto; Yoshini, Masahiko; Ariizumi, Takashi; Okami, Yuji; Takada, Yoshikazu; and Inagaki, Junichi, 4,986,341, Cl. 164-477.000.
Inagaki, Yasunori: *See*—
Yasuda, Shinichiro; and Inagaki, Yasunori, 4,986,450, Cl. 222-169.000.
Inagaki, Yoshio, to Kabushiki Kaisha Toshiba. Automatic gain control apparatus which adjusts bias and gain to maximize signal to noise ratio. 4,987,298, Cl. 250-214.0AG.
Inagaki, Yoshio: *See*—
Hirano, Shigeo; Katoh, Kazunobu; Inagaki, Yoshio; and Inoue, Nobuaki, 4,987,052, Cl. 430-264.000.
Inamiya, Kenichi, to Mitsubishi Denki Kabushiki Kaisha. Method of determining a position using satellites. 4,987,420, Cl. 342-457.000.
Inco Limited: *See*—
Bell, James A. E., 4,986,234, Cl. 123-193.0CP.
Indianapolis Center for Advanced Research: *See*—
Burney, Bryan T.; Griffith, Steven L.; Fry, Francis J.; Jang, Yue-Teh; Thornton, Pamela M.; and Liebmann, Vern L., 4,986,814, Cl. 604-164.000.
Ingersoll-Rand Company: *See*—
Swarden, Michael C.; Faulkner, Henry B.; Brassert, Walter L.; and Stoudt, James E., 4,986,479, Cl. 241-15.000.
Vanderjagt, John A., 4,986,304, Cl. 137-614.020.
Ingley, Peter: *See*—
Watkins, David R.; Griffiths, Gerald A.; and Ingley, Peter, 4,986,326, Cl. 152-532.000.
Inman, Stephen L.: *See*—
Kennedy, Richard A.; Zarabadi, Seyed R.; Inman, Stephen L.; and Gravenstein, Martin G., 4,987,387, Cl. 331-1.00A.
Innova Pure Water Inc.: *See*—
Nohren, John, Jr.; and Nohren, Joseph H., 4,986,901, Cl. 210-85.000.
Inoue, Haruo: *See*—
Ishida, Yuzuru; Mitsuboshi, Masahiro; Inoue, Haruo; Otsuka, Ichiro; and Iio, Keiji, 4,987,170, Cl. 524-267.000.
Inoue, Masahiro: *See*—
Uno, Masaru; Ueda, Kanji; Inoue, Masahiro; and Kaji, Shinichi, 4,986,835, Cl. 55-26.000.
Inoue, Noboru, to Itoki Co., Ltd. Tilting mechanism for supporting seat portion and backrest of chair in integral fashion. 4,986,601, Cl. 297-301.000.
Inoue, Nobuaki: *See*—
Hirano, Shigeo; Katoh, Kazunobu; Inagaki, Yoshio; and Inoue, Nobuaki, 4,987,052, Cl. 430-264.000.
Inoue, Ryuzaburo; and Oota, Tadaki, to Nissan Motor Company, Ltd. Internal combustion engine air-fuel ratio control system including alcohol sensor back-up control arrangement. 4,986,241, Cl. 123-479.000.
Inoue, Takeshi: *See*—
Hidaka, Yasuhiro; Magami, Masato; Inoue, Takeshi; and Nakane, Sumio, 4,987,148, Cl. 514-441.000.
Inoue, Yasuo: *See*—
Kobayashi, Kiyoteru; Nishimura, Tadashi; Morita, Hiroshi; Nakao, Shuji; Oda, Hidekazu; and Inoue, Yasuo, 4,987,092, Cl. 437-57.000.
Inoue, Yoshihisa, to Nakamichi Corporation. Drive and winding reel arrangement in a magnetic recording and reproducing device. 4,987,504, Cl. 360-95.000.
Inoue, Yoshio; Arai, Masatoshi; and Kimura, Tsuneo, to Shin-Etsu Chemical Co., Ltd. Foamable organopolysiloxane composition. 4,987,155, Cl. 521-77.000.
Inresco, Inc.: *See*—
Mulshine, James P., 4,987,512, Cl. 361-57.000.
Institut Francais du Petrole: *See*—
Czernichow, Jean, 4,986,350, Cl. 166-65.100.
Integrated Device Technology, Inc.: *See*—
Hsu, Fu-Chieh; Wong, Chun-Chiu D.; and Hanrahan, Ciaran P., 4,987,090, Cl. 437-52.000.
Interaims Aktiebolag: *See*—
Ekstrand, John A. I., 4,986,645, Cl. 350-560.000.
Interior Creators, Inc.: *See*—
Power, Richard S., 4,986,047, Cl. 52-238.100.
International Business Machines Corporation: *See*—
Araps, Constance J.; Casey, Jon A.; Divakaruni, Renuka S.; Kandetzke, Steven M.; and Lotsko, Chatherine A., 4,987,211, Cl. 526-251.000.
Batey, John; Tiwari, Sandip; and Wright, Steven L., 4,987,095, Cl. 437-106.000.
Burke, Ronald D.; and Mattes, Carl J., 4,987,318, Cl. 307-443.000.
Clark, Connie M.; Harding, Warren B.; and Tang, Horace T. S., 4,987,533, Cl. 364-200.000.
Cronin, John E.; Kasnta, Carter W.; and Leach, Michael A., 4,985,990, Cl. 29-852.000.
Eigler, Donald M., 4,987,312, Cl. 250-492.300.
Jolissaint, Charles H., 4,987,587, Cl. 379-94.000.
Kaanta, Carter W.; and Roberts, Stanley, 4,987,101, Cl. 437-228.000.
Leonard, Anne G.; and Verburg, Richard L., 4,987,550, Cl. 364-521.000.
McBride, Donald G.; and Ellis, Theron L., 4,987,100, Cl. 437-206.000.
Yamaguchi, Hidefumi, 4,986,637, Cl. 350-339.00F.
International Development Systems, Inc.: *See*—
Code, James, 4,986,817, Cl. 604-192.000.
International Paper Company: *See*—
Greenberg, Ronald; Rogers, Randy; Bernier, Roland; and Littman, Stanley, 4,987,024, Cl. 428-219.000.
International Technical Associates: *See*—
Lovoi, Paul A., 4,986,664, Cl. 356-376.000.
InterVentional Technologies, Inc.: *See*—
Farr, Andrew F., 4,986,807, Cl. 604-22.000.
Inujima, Takashi: *See*—
Yamazaki, Shunpei; Suzuki, Kunio; Nagayama, Susumu; Inujima, Takashi; Abe, Masayoshi; Fukada, Takeshi; Kinka, Mikio; Kobayashi, Ippei; Shibata, Katsuhiko; Susukida, Masato; and Koyanagi, Kaoru, 4,986,213, Cl. 118-719.000.
Inushima, Takashi: *See*—
Yamazaki, Shunpei; Tsuchiya, Mitsunori; Kawano, Atsushi; Imatou, Shinji; Nakashita, Kazuhisa; Hamatani, Toshiji; Inushima, Takashi; and Itou, Kenji, 4,987,004, Cl. 427-38.000.
Inventio AG: *See*—
Prewer, John R.; and Power, Leslie B., 4,986,040, Cl. 52-79.100.
Prewer, John R.; and Power, Leslie B., 4,986,041, Cl. 52-79.500.
Invernizzi, Renzo: *See*—
Calderazzo, Fausto; Pampaloni, Guido; Masi, Francesco; Moalli, Angelo; and Invernizzi, Renzo, 4,987,111, Cl. 502-113.000.
Ion Tech Limited: *See*—
Franks, Joseph, 4,986,914, Cl. 210-502.100.
Irby, Richard E.; Kyker, G. Stephen; DiSano, Lorenzo P.; and Alvarez, Eduardo, to Dresser Industries, Inc.; and Hoechst Celanese Corporation, a part interest. Seal structure for elevated temperature service. 4,986,511, Cl. 251-1.300.
Irgens, Christopher R.; and Bailey, Francis V., to Outboard Marine Corporation. Method for forming ported cylinder sleeve liner foam pattern. 4,986,942, Cl. 264-51.000.
Irlesberger, Kurt H.: *See*—
Engelhaupt, Darell E.; and Irlesberger, Kurt H., 4,986,130, Cl. 73-760.000.
Irschik, Herbert: *See*—
Reichenbach, Hans; Hofle, Gerhard; Augustiniak, Hermann; Bedorf, Norbert; Gerth, Klaus; Irschik, Herbert; Jansen, Rolf; Kunze, Brigitte; Schomburg, Dietmar; Steinmetz, Heinrich; Trowitzsch-Kienast, Wolfram; and Wray, Victor, 4,987,072, Cl. 435-119.000.
Irvin Automotive Products, Inc.: *See*—
Decker, John H.; and Halajian, Eugene M., 4,986,674, Cl. 384-10.000.
Irvin, Mark A. Apparatus for dispensing and retracting tape. 4,986,487, Cl. 242-107.500.
Isco, Inc.: *See*—
Allington, Robert W., 4,986,919, Cl. 210-656.000.
Ish, Arthur B., III, to Vectra Fitness, Inc. Multi-station exercise machine with multi-exercise press station. 4,986,538, Cl. 272-134.000.
Ishibashi, Morito: *See*—
Ichinose, Susumu; Tetsutani, Nobuji; and Ishibashi, Morito, 4,987,487, Cl. 358-92.000.

Ishida, Akinori; Aida, Satoshi; and Iwama, Nobuyuki, to Kabushiki Kaisha Toshiba. Ultrasonic therapy apparatus. 4,986,275, Cl. 128-660.030.
Ishida, Hitoshi: *See*—
Yamauchi, Noriyoshi; Ishida, Hitoshi; Kawai, Kazuaki; and Mizukusa, Yasuyuki, 4,986,338, Cl. 164-457.000.
Ishida, Noriya: *See*—
Suzuki, Kunio; Fukada, Takeshi; Kinka, Mikio; Abe, Masayoshi; Shibata, Katsuhiko; Susukida, Masato; Ishida, Noriya; Satake, Akemi; and Arai, Yasuyuki, 4,987,005, Cl. 427-39.000.
Ishida, Yuzuru; Mitsuboshi, Masahiro; Inoue, Haruo; Otsuka, Ichiro; and Iio, Keiji, to Mitsui Toatsu Chemicals, Inc. Styrene resin composition excellent in sliding properties. 4,987,170, Cl. 524-267.000.
Ishigami, Hidetoshi, to Kabushiki Kaisha Toshiba. Pointing apparatus. 4,987,411, Cl. 340-709.000.
Ishigami, Sumiyuki: *See*—
Uchiyama, Futoshi; Agatsuma, Ko; Ohara, Takeshi; Tsukamoto, Koichi; Ishigami, Sumiyuki; Sato, Mitsuru; and Sugimoto, Hisashi, 4,986,670, Cl. 374-117.000.
Ishihara Sangyo Kaisha Ltd.: *See*—
Haga, Takahiro; Yamada, Nobutoshi; Sugi, Hideo; Koyanagi, Toru; and Okada, Hiroshi, 4,987,135, Cl. 514-274.000.
Ishii, Akira; Terui, Takashi; Hiraoka, Toyoki; and Murakami, Yuichi, to Nissan Motor Co., Ltd. Oil pan for internal combustion engine. 4,986,235, Cl. 123-195.00C.
Ishii, Koji; and Ikeda, Naoki, to Ryobi Ltd. Device for connecting and disconnecting dampening system and inking system in offset printing machine. 4,986,176, Cl. 101-148.000.
Ishii, Masao: *See*—
Maeda, Miduho; Takamatsu, Hideo; Ishii, Masao; and Minatono, Shobu, 4,987,194, Cl. 525-314.000.
Ishii, Masashi: *See*—
Tozune, Sigeru; Yamazaki, Shizuo; Komori, Ryuichi; Ishii, Masashi; Sakaguchi, Yoshio; and Oda, Tetsuya, 4,987,156, Cl. 521-99.000.
Ishii, Susumu: *See*—
Terada, Yasuharu; and Ishii, Susumu, 4,985,969, Cl. 24-429.000.
Ishii, Toshihiko, to Mitsubishi Denki Kabushiki Kaisha. Brushless motor driver. 4,987,352, Cl. 318-254.000.
Ishii, Toshitsuga; Imai, Isao; Sano, Akira; and Sueyoshi, Kouichi, to Toshiba Ceramics Co., Ltd. Method for making silicon nitride powder. 4,986,972, Cl. 423-344.000.
Ishii, Tsutomu: *See*—
Gohbara, Masatoshi; Asano, Tamotsu; Ozawa, Shuji; Yamazaki, Hideo; Ishii, Tsutomu; Nishida, Makoto; Watanabe, Junko; and Sato, Naoki, 4,986,846, Cl. 71-92.000.
Ishikawa, Masayuki; Okuda, Hajime; Shiozawa, Hideo; Itaya, Kazuhiko; Watanabe, Yukio; Suzuki, Mariko; and Hatakoshi, Genichi, to Kabushiki Kaisha Toshiba. Manufacturing method of semiconductor laser with non-absorbing mirror structure. 4,987,096, Cl. 437-129.000.
Ishikawa, Masayuki: *See*—
Nitta, Koichi; Nishikawa, Yukie; Ishikawa, Masayuki; Tsuburai, Yasuhiko; and Kokubun, Yoshihiro, 4,987,097, Cl. 437-129.000.
Ishikawa Prefecture: *See*—
Morohashi, Kazuo; Kawasaki, Masayoshi; Tsukabayashi, Kazuo; and Hamade, Saburo, 4,986,316, Cl. 139-452.000.
Ishikawa, Tsutomu, to Sanyo Electric Co., Ltd. Gain controlled amplifier circuit. 4,987,380, Cl. 330-254.000.
Ishikawa, Yoshiaki, to Aisin Seiki Kabushiki Kaisha. Door closing device. 4,986,579, Cl. 292-201.000.
Ishikawa, Yuichi; Yoshimura, Toshihiko; Shimizu, Tasuku; Otaka, Masahiro; and Takaku, Kazuo, to Hitachi, Ltd. Method and apparatus for predicting deterioration of a member constituting a part of equipment. 4,987,367, Cl. 324-227.000.
Ishikawajima-Harima Heavy Industries Co., Ltd.: *See*—
Fukase, Hisahiko; Matsui, Kunio; Nomura, Akihiro; and Hirata, Atsushi, 4,986,336, Cl. 164-415.000.
Ishimaru, Katsutoshi; Shimada, Akira; Teshima, Shinichi; and Hayashi, Yuzo, to Yoshitomi Pharmaceutical Industries, Ltd.; and Toyo Boseki Kabushiki Kaisha. Maltooligosaccharide derivatives and reagents for determination of amylase activity. 4,987,067, Cl. 435-22.000.
Isobe, Mitsuo: *See*—
Hamano, Takahiro; Matsui, Masataka; and Isobe, Mitsuo, 4,987,560, Cl. 365-200.000.
Isobe, Takeshi: *See*—
Kuragano, Morimasa; Iwasaki, Kozo; Isobe, Takeshi; Fukada, Isao; Koshibe, Minoru; Sezaki, Yoshihiro; Segawa, Hirozo; and Yoguchi, Katsuji, 4,987,252, Cl. 562-600.000.
Isomoto, Jun: *See*—
Anzue, Kaoru; Isomoto, Jun; and Takei, Nobuo, 4,986,552, Cl. 277-38.000.
Isozumi, Shuzoo: *See*—
Morishita, Akira; and Isozumi, Shuzoo, 4,986,140, Cl. 74-7.00C.
Itabashi, Yuichi; Hayashi, Takayuki; and Igarashi, Akira, to Fuji Photo Film Co., Ltd. Heat-sensitive recording material. 4,987,117, Cl. 503-200.000.
Itakura, Masami: *See*—
Nakamura, Kiichi; Itakura, Masami; Atsumi, Yasuhiko; Watanabe, Hideo; and Kanagawa, Youiti, 4,987,009, Cl. 427-96.000.
Itaya, Kazuhiko: *See*—
Ishikawa, Masayuki; Okuda, Hajime; Shiozawa, Hideo; Itaya, Kazuhiko; Watanabe, Yukio; Suzuki, Mariko; and Hatakoshi, Genichi, 4,987,096, Cl. 437-129.000.
ITM Industrial Technology & Machines AG: *See*—
Tuma, Martin, 4,986,163, Cl. 89-196.000.
Ito, Koichi: *See*—
Mori, Eiji; Sonoda, Hidefumi; Hiraku, Akira; Minezawa, Morio; Kato, Isao; and Ito, Koichi, 4,986,840, Cl. 55-316.000.
Ito, Kouichi: *See*—
Yamauchi, Takatsugu; and Ito, Kouichi, 4,986,598, Cl. 296-217.000.
Ito, Noriichi: *See*—
Tatematsu, Shinzo; Omata, Kazuki; Hashimoto, Tatsuo; Takahashi, Masato; and Ito, Noriichi, 4,987,031, Cl. 428-402.200.
Ito, Noriki; Nagano, Yoshinobu; Tanaka, Akihiro; Numasaki, Yoso; and Takahashi, Koichiro, to Yamanouchi Pharmaceutical Co., Ltd. 6-[p-[5-(1-imidazolyl)pentyloxy]phenoxy]-2,2-dimethyl-hexanoic acid compounds which are useful in treating tumors. 4,987,147, Cl. 514-399.000.
Ito, Ryohei. Apparatus pursueing the sun. 4,986,255, Cl. 126-424.000.
Itoh, Kenichiro; Yamada, Takeshi; Onodera, Tsutomu; Yoshinuma, Mikio; and Kato, Yasuyuki, to Fujikura Ltd.; and Nippon Telegraph and Telephone Corporation. Apparatus for fusion-splicing a pair of polarization maintaining optical fibers. 4,986,843, Cl. 65-152.000.
Itoki Co., Ltd.: *See*—
Inoue, Noboru, 4,986,601, Cl. 297-301.000.
Itou, Kenji: *See*—
Yamazaki, Shunpei; Tsuchiya, Mitsunori; Kawano, Atsushi; Imatou, Shinji; Nakashita, Kazuhisa; Hamatani, Toshiji; Inushima, Takashi; and Itou, Kenji, 4,987,004, Cl. 427-38.000.
Itou, Takeo; Matsuda, Hidemi; and Tanaka, Hajime, to Kabushiki Kaisha Toshiba. Cathode ray tube with film on face-plate. 4,987,338, Cl. 313-478.000.
Ivey, Don L. AD-IV breakaway system for timber utility poles. 4,986,687, Cl. 403-2.000.
Iwabuchi, Yoshitaka; Wada, Yoshiyo; and Nishihata, Toshihiko, to Victor Company of Japan, Ltd. Magnetic head device having photo detector cell. 4,987,505, Cl. 360-103.000.
Iwai, Akira: *See*—
Ohba, Yozo; Yamanaka, Masaki; Sudo, Moriyasu; and Iwai, Akira, 4,986,866, Cl. 156-220.000.
Iwama, Nobuyuki: *See*—
Aida, Satoshi; and Iwama, Nobuyuki, 4,986,259, Cl. 128-24.00A.
Ishida, Akinori; Aida, Satoshi; and Iwama, Nobuyuki, 4,986,275, Cl. 128-660.030.
Iwamoto, Akira: *See*—
Takasaki, Takashi; Yanai, Reikichi; Amakawa, Shigeru; Takizawa, Yoichi; and Iwamoto, Akira, 4,986,999, Cl. 426-656.000.
Iwamoto, Masatoshi; and Owada, Toshinobu, to Kubota Ltd. Apparatus for adjusting the tread of steerable wheels of a vehicle. 4,986,386, Cl. 180-209.000.
Iwasaki, Jyuzaemon; Nakano, Hideharu; Tsuno, Masahiro; and Nakamura, Zenichi, to Matsushita Electric Works, Ltd. Hand-held clipper for removing entangled fibers from the surface of fabrics. 4,985,999, Cl. 30-206.000.
Iwasaki, Kozo: *See*—
Kuragano, Morimasa; Iwasaki, Kozo; Isobe, Takeshi; Fukada, Isao; Koshibe, Minoru; Sezaki, Yoshihiro; Segawa, Hirozo; and Yoguchi, Katsuji, 4,987,252, Cl. 562-600.000.
Iwata, Kazuo; Tochihara, Shinichi; and Koike, Shoji, to Canon Kabushiki Kaisha. Recording liquid:water composition with 25 cp minimum viscosity at 9:1 blend and 15 cp maximum viscosity at 1:1 blend. 4,986,850, Cl. 106-25.000.
Iwata, Kazuo: *See*—
Shikama, Shinsuke; Toide, Eiichi; Kondou, Mitsushige; and Iwata, Kazuo, 4,987,566, Cl. 369-122.000.
Iwaya, Shouichi; Hamada, Munemitsu; and Masumura, Hitoshi, to TDK Corporation. Ceramic capacitor with electrodes formed by reduction. 4,987,515, Cl. 361-321.000.
Izuka, Akihiro; Onizawa, Yoshio; and Yamashita, Mitsuru, to Daicel Chemical Industries Ltd. Process for producing plastic substrate for optical disks. 4,986,938, Cl. 264-1.300.
Izukawa, Tsukuru; Ikado, Shuhei; and Enomoto, Toshiyuki, to Mitsui Toatsu Chemicals, Inc. Thermosetting resin composition for injection molding. 4,987,198, Cl. 525-491.000.
Izumi, Tetsujirou: *See*—
Okamoto, Hironobu; Izumi, Tetsujirou; Kishi, Hiroo; and Okamoto, Naoki, 4,986,384, Cl. 180-167.000.
J. H. Benecke AG: *See*—
Wagner, Werner; Bruder, Axel; and Giehsler, Kurt, 4,987,029, Cl. 428-319.300.
J. I. Case Company: *See*—
Ricketts, Jonathan E., 4,986,794, Cl. 460-67.000.
J. M. Huber Corporation: *See*—
Wason, Satish K., 4,987,162, Cl. 523-212.000.
J. M. Voith GmbH: *See*—
Haessner, Winfried; Kugler, Georg; and Wolf, Robert, 4,986,009, Cl. 34-23.000.
Hafner, Paul; and Schiel, Christian, 4,986,178, Cl. 100-174.000.
Sollinger, Hans-Peter; and Madrzak, Zygmunt, 4,985,972, Cl. 29-116.200.
Jablonka, Bernd: *See*—
Schonafinger, Karl; Beyerle, Rudi; Schindler, Ursula; Jablonka, Bernd; and Troke, Jeffery, 4,987,134, Cl. 514-252.000.
Jack, David E., to Prevent-A-Crime International, Inc. Method of making a stencil for etching glass. 4,987,287, Cl. 219-121.690.
Jackson, Payton, Jr. Collapsible shed for vehicles and other objects. 4,986,037, Cl. 52-67.000.
Jackson, Ronald E. Level sensor and alarm. 4,987,409, Cl. 340-623.000.

Jackson, Walter L. Magnetic ball and jack set. 4,986,539, Cl. 273-1.0GD.

Jacob, Merritt; Oswald, Gerald L.; and Goffin, Glen P., II, to Atlas Powder Company. Method and apparatus for calibration of electronic delay detonation circuits. 4,986,183, Cl. 102-200.000.

Jacobs, James K.: *See*—
Gupta, Sankar Das; and Jacobs, James K., 4,986,887, Cl. 204-129.000.

Jacobs, Martin I.; Schrock, Fredric L.; and Derse, David P., to Uniroyal Plastics Co., Inc. Flame retardant fabric structure. 4,987,026, Cl. 428-246.000.

Jacobsen, Trond, to Nycomed AS. Water-soluble, carrier-bound paramagnetic metal containing diagnostic agents. 4,986,980, Cl. 424-9.000.

Jacobson, D. John, to Newcomb Spring Corp. Apparatus for coiling springs with tucked ends. 4,986,103, Cl. 72-137.000.

Jacobsson, Kent; and Carlsson, Hans, to Tetra Park Holdings & Finance S.A. Opening arrangement on a packing container. 4,986,465, Cl. 229-123.300.

Jacono, Carmelo; and Tribastone, Salvatore, to Enichem Anic S.p.A. Bituminous composition for road surfacing. 4,987,166, Cl. 524-68.000.

Jacquinet, Jean-Claude: *See*—
Choay, Jean; Jacquinet, Jean-Claude; Petitou, Maurice; and Sinay, Pierre, 4,987,223, Cl. 536-17.700.

Jager, Horst, to Karl Mayer Textilmaschinenfabrik. Process and warp knitting machine for the production of pile ware. 4,986,091, Cl. 66-84.00R.

Jakobowski, Walter T. Elevated brake light signal module. 4,987,405, Cl. 340-479.000.

Jang, Guang-Way: *See*—
Wei, Yen; Jang, Guang-Way; and Chan, chi-Cheung, 4,986,886, Cl. 204-78.000.

Jang, Yue-Teh: *See*—
Burney, Bryan T.; Griffith, Steven L.; Fry, Francis J.; Jang, Yue-Teh; Thornton, Pamela M.; and Liebmann, Vern L., 4,986,814, Cl. 604-164.000.

Janome Sewing Machine Company Limited: *See*—
Hyodo, Toru; and Sasano, Akiyoshi, 4,986,201, Cl. 112-456.000.

Jansen, Rolf: *See*—
Reichenbach, Hans; Hofle, Gerhard; Augustiniak, Hermann; Bedorf, Norbert; Gerth, Klaus; Irschik, Herbert; Jansen, Rolf; Kunze, Brigitte; Schomburg, Dietmar; Steinmetz, Heinrich; Trowitzsch-Kienast, Wolfram; and Wray, Victor, 4,987,072, Cl. 435-119.000.

Janssen, Ludovicus H. W.: *See*—
Van Geem, Paul C.; and Janssen, Ludovicus H. W., 4,987,265, Cl. 568-435.000.

Janssens, Wilhelmus: *See*—
Roosen, Raymond A.; De Meyer, Marcellus H.; and Janssens, Wilhelmus, 4,987,043, Cl. 430-7.000.
Vanmaele, Luc J.; and Janssens, Wilhelmus, 4,987,119, Cl. 503-227.000.

Jantz, Robert F. Infant carrier seat rocker. 4,985,949, Cl. 5-109.000.

Japan as represented by Director General of Agency of Industrial Science and Technology: *See*—
Tanihara, Koichi, 4,986,969, Cl. 423-115.000.

Japan Electronic Control Systems Company, Limited: *See*—
Nakaniwa, Shinpei; and Kashiwabara, Masuo, 4,986,245, Cl. 123-492.000.

Japan Synthetic Rubber Co., Ltd.: *See*—
Sato, Hozumi; Shimada, Humito; Sakaguchi, Akio; Takemura, Yasuhiko; Nishi, Tadaaki; Ono, Hisao; Nagano, Masanobu; and Miyachi, Takumi, 4,987,017, Cl. 428-36.800.

Japan Tobacco Inc.: *See*—
Kumata, Kabsuhiko; Endo, Isao; and Tachikawa, Hitoshi, 4,986,718, Cl. 414-421.000.

Jensen, Harold A., to Katana Corporation. Method for forming angular seals in side-gussetted bags. 4,986,804, Cl. 493-193.000.

Jeske, Clifford O.: *See*—
Stratton, Michael; and Jeske, Clifford O., 4,986,167, Cl. 92-186.000.

Jidosha Denki Kogyo Kabushiki Kaisha: *See*—
Masaki, Yozo, 4,986,385, Cl. 180-179.000.

Jochijms, Antonius J. G.: *See*—
Pelgrom, Marcellinus J. M.; Jochijms, Antonius J. G.; and Van Roermund, Arthur H. M., 4,987,580, Cl. 377-60.000.

Jochum, Joachim: *See*—
Hirth, Michael; Jochum, Joachim; and Wieckert, Christian, 4,986,347, Cl. 165-94.000.

Johann Henkenjohann, Firma: *See*—
Henkenjohann, Gerda, 4,986,331, Cl. 160-201.000.

Johanson, Jerry R., to JR Johanson, Inc. Flow rate controller and feeder. 4,986,456, Cl. 222-561.000.

John Heathcoat & Company Limited: *See*—
Buckley, Roy W., 4,987,015, Cl. 427-389.900.

Johnsgard, Mark W., to Airgard, Inc. Inlet system for gas scrubber. 4,986,838, Cl. 55-223.000.

Johnson, Danny L.; Sollman, John R.; and Harker, Larry A., to Western Medical Consultants. Automated processing of provider billings. 4,987,538, Cl. 364-401.000.

Johnson, Dean P., to VLSI Technology, Inc. Leadframe system with multi-tier leads. 4,987,473, Cl. 357-70.000.

Johnson, Eric: *See*—
Brunetti, Armando; Johnson, Eric; and Martz, Laura, 4,986,050, Cl. 52-488.000.

Johnson, Henryka, heiress: *See*—
Johnson, John, deceased; and Johnson, Henryka, heiress, 4,986,370, Cl. 173-31.000.

Johnson, James K., to United States of America, Navy. Acoustic target doppler simulator. 4,986,755, Cl. 434-008.000.

Johnson, John, deceased; and by Johnson, Henryka, heiress. Pneumatic hammer lift. 4,986,370, Cl. 173-31.000.

Johnson, Lee R.; Smith, Elizabath A.; and Myers, Howard L., to Scientific-Atlanta, Inc. Automatic interactive television terminal configuration. 4,987,486, Cl. 358-86.000.

Johnson Matthey Inc.: *See*—
Nguyen, My N.; Wood, Julie H.; and Herrington, Thomas L., 4,986,849, Cl. 106-1.140.

Johnson, Michael F.; Roberts, Lyn M.; and Cooper, David E., to Lynx Business Machines Limited. Lock system and lock having two electronic control systems. 4,986,099, Cl. 70-277.000.

Johnson, Roy L.: *See*—
Belanger, Thomas D., Jr.; and Johnson, Roy L., 4,987,516, Cl. 361-413.000.

Johnson Service Company: *See*—
O'Brien, Michael J., 4,987,528, Cl. 364-184.000.

Johnson, Stefan J. Modular multiple musical instrument stand. 4,986,158, Cl. 84-327.000.

Johnston, Mark, to Yetter Manufacturing Company. Depth gauge wheel. 4,986,200, Cl. 111-135.000.

Johnston, Ova E.: *See*—
Hampl, Vladimir; and Johnston, Ova E., 4,986,703, Cl. 409-131.000.

Jolissaint, Charles H., to International Business Machines Corporation. Method and apparatus for providing 800 number service. 4,987,587, Cl. 379-94.000.

Jonas, Friedrich; Heywang, Gerhard; Schmidtberg, Werner; Heinze, Jurgen; and Dietrich, Michael, to Bayer Aktiengesellschaft. Polythiophenes, process for their preparation and their use. 4,987,042, Cl. 429-213.000.

Joneikis, Albert E.: *See*—
Holmes, William K.; and Joneikis, Albert E., 4,986,252, Cl. 125-21.000.

Jones, Carolyn S. Gift wrap design. 4,987,019, Cl. 428-42.000.

Jones, Frank: *See*—
Mueller, Mark D.; Jones, Frank; Quintana, Julio; Ruddy, Kenneth E.; and Mims, Michael, 4,986,361, Cl. 166-381.000.

Jones, Gregory G.: *See*—
Agarwal, Vinod K.; Dixon, Barry M.; Foerster, Joseph C.; and Jones, Gregory G., 4,986,529, Cl. 271-291.000.

Jones, Kathie K. Urinal for use by female individuals. 4,985,940, Cl. 4-301.000.

Jones, Nelson E.: *See*—
Blackmon, James B.; Cady, Edwin C.; and Jones, Nelson E., 4,986,346, Cl. 165-86.000.

Jones, Walton B.; and Elterich, Richard C., to Capital Controls Company, Inc. Method and apparatus for chlorinating water with liquefied chlorine. 4,986,296, Cl. 137-3.000.

Jones, William K. Adjustment for garment. 4,985,936, Cl. 2-269.000.

Jongin, Jung, to Samsung Electron Devices Co., Ltd. Process of forming an impregnated cathode. 4,986,788, Cl. 445-50.000.

Joos, Heinz: *See*—
Krenkel, Bernhard; and Joos, Heinz, 4,985,970, Cl. 28-141.000.

Jopson, Edward J.: *See*—
Bienert, Walter B.; Jopson, Edward J.; and Lanza, Richard J., 4,986,253, Cl. 126-21.00A.

Jost, Gunter: *See*—
Weisweiler, Manfred; and Jost, Gunter, 4,986,744, Cl. 425-94.000.

Jouet, Jean M.: *See*—
Imbert, Claude; Jouet, Jean M.; and Carre, Patrick, 4,986,818, Cl. 604-192.000.

JR Johanson, Inc.: *See*—
Johanson, Jerry R., 4,986,456, Cl. 222-561.000.

Jung, Jong K.: *See*—
An, Tae W.; Jung, Jong K.; Yoo, Yung C.; Lee, Pil H.; and Son, Tae W., 4,987,208, Cl. 528-272.000.

Jung, Michael: *See*—
Katzschner, Werner; Eichholz, Stefan; Geisler, Michael; and Jung, Michael, 4,987,346, Cl. 315-111.410.

Jungwirth, Douglas R., to Northrop Corporation. Piezoelectric dither motor. 4,987,334, Cl. 310-333.000.

K. S. Consult Service Co., Inc.: *See*—
Ueno, Keisuke, 4,987,022, Cl. 428-182.000.

K-2 Corporation: *See*—
Chastain, William P., 4,987,282, Cl. 219-76.140.

Kaanta, Carter W.; and Roberts, Stanley, to International Business Machines Corporation. Method for providing improved insulation in VLSI and ULSI circuits. 4,987,101, Cl. 437-228.000.

Kaanta, Carter W.: *See*—
Cronin, John E.; Kaanta, Carter W.; and Leach, Michael A., 4,985,990, Cl. 29-852.000.

Kabashima, Kengi: *See*—
Ryu, Ushio; Ono, Hideo; Kabashima, Kengi; Masushige, Yutaka; Matsuo, Teruhiko; and Koyanagi, Tadashi, 4,986,483, Cl. 242-45.000.

Kabat, Thomas W. Mounting device. 4,986,503, Cl. 248-181.000.

Kabushiki Kaisha Daikin Seisakusho: *See*—
Kajitani, Koji; and Abe, Minoru, 4,986,404, Cl. 192-109.00F.
Yoshimura, Yoshinari; and Murata, Ikuo, 4,985,973, Cl. 29-173.000.

Kabushiki Kaisha Kawaigakki Seisakusho, Shiz: *See*—
Matsushima, Tadashi; and Saito, Tsutomu, 4,986,159, Cl. 84-660.000.

Kabushiki Kaisha Kenwood: *See*—
Sakamoto, Masakatu; Yaguchi, Youichi; Toshima, Hiroaki; and Kotaki, Toshiroh, 4,987,002, Cl. 427-34.000.

Kabushiki Kaisha Kobe Seiko Sho: *See*—
Hagiwara, Katsunobu, 4,986,745, Cl. 425-182.000.
Kubomoto, Wataru, 4,986,072, Cl. 60-421.000.
Miyaoka, Satoshi, 4,986,165, Cl. 91-529.000.

Kabushiki Kaisha Machida Seisakusho: *See*—
Chikama, Toshio, 4,986,257, Cl. 128-4.000.

Kabushiki Kaisha Shinkawa: *See*—
Yamazaki, Nobuto; Ushiki, Hiroshi; and Katakubo, Kenji, 4,986,460, Cl. 228-4.500.

Kabushiki Kaisha Tokai Denki Seisakusho: *See*—
Hamamoto, Tadanao; Wakiya, Tadashi; and Hayashi, Kazunari, 4,986,646, Cl. 350-637.000.

Kabushiki Kaisha TOPCON: *See*—
Wakatsuki, Hiroshi, 4,986,618, Cl. 312-276.000.
Yokokura, Takashi; Hori, Nobuo; Shimozono, Hiroaki; and Niimura, Satoru, 4,986,653, Cl. 356-5.000.

Kabushiki Kaisha Toshiba: *See*—
Aida, Satoshi; and Iwama, Nobuyuki, 4,986,259, Cl. 128-24.00A.
Aoki, Masayuki, 4,987,556, Cl. 364-580.000.
Hamano, Takahiro; Matsui, Masataka; and Isobe, Mitsuo, 4,987,560, Cl. 365-200.000.
Inagaki, Yoshio, 4,987,298, Cl. 250-214.0AG.
Ishida, Akinori; Aida, Satoshi; and Iwama, Nobuyuki, 4,986,275, Cl. 128-660.030.
Ishigami, Hidetoshi, 4,987,411, Cl. 340-709.000.
Ishikawa, Masayuki; Okuda, Hajime; Shiozawa, Hideo; Itaya, Kazuhiko; Watanabe, Yukio; Suzuki, Mariko; and Hatakoshi, Genichi, 4,987,096, Cl. 437-129.000.
Itou, Takeo; Matsuda, Hidemi; and Tanaka, Hajime, 4,987,338, Cl. 313-478.000.
Nitta, Koichi; Nishikawa, Yukie; Ishikawa, Masayuki; Tsuburai, Yasuhiko; and Kokubun, Yoshihiro, 4,987,097, Cl. 437-129.000.
Ohtsuka, Eiji, 4,987,591, Cl. 379-279.000.
Saito, Satoshi, 4,986,262, Cl. 128-6.000.
Sato, Itsuko; Naito, Katsuyuki; Genma, Nobuhiro; and Azuma, Makoto, 4,987,023, Cl. 428-215.000.
Shibata, Hidenori; Iesaka, Mamoru; and Oosawa, Shinji, 4,987,466, Cl. 357-24.000.
Takeda, Kazuo, 4,986,423, Cl. 209-540.000.
Ukita, Teruhiko, 4,987,596, Cl. 381-41.000.

Kabushiki Kaisha Toyoda Jidoshokki Seisakusho: *See*—
Miyano, Takayuki; and Nii, Shinsuke, 4,987,522, Cl. 362-74.000.
Mouri, Kaneo; Wakuda, Masahide; and Baba, Noriaki, 4,987,390, Cl. 332-173.000.

Kabushiki Kaisha Toyota Chuo Kenkyusho: *See*—
Mizutani, Tadashi; Fukushima, Yoshiaki; Doi, Haruo; and Kamigaito, Osami, 4,987,106, Cl. 501-147.000.
Sugiyama, Susumu; Yamashita, Shiro; and Funabashi, Hirofumi, 4,986,131, Cl. 73-766.000.

Kabushiki Kaisha Vitamin Kenkyusho: *See*—
Kurono, Masayasu; Yamakawa, Hidehumi; Koshizaka, Takuya; Suzuki, Takehiko; Kato, Eiichi; Iida, Takafumi; Ohishi, Nobuko; and Yagi, Kunio, 4,987,150, Cl. 514-455.000.

Kabushikigaisha Tokyo Kikai Seisakusho: *See*—
Kobayashi, Toshiro; Hiraishi, Hisashi; Hineno, Makoto; Kawata, Tomoshi; Kohara, Yuuji; and Saito, Masaharu, 4,986,181, Cl. 101-348.000.

Kaczmarczyk, Edward T.; and Rae, Rory, to Deere & Company. Mounting structure for a loader attachment. 4,986,722, Cl. 414-723.000.

Kageyama, Yukihiko: *See*—
Nakane, Toshio; Hijikata, Kenji; Iiyama, Makoto; Kageyama, Yukihiko; and Naka, Michirou, 4,987,167, Cl. 524-95.000.

Kai, Masashi: *See*—
Oguma, Tomio; and Kai, Masashi, 4,986,290, Cl. 134-95.000.

Kaiser Aerospace & Electronics Corporation: *See*—
Berman, Arthur L.; and Lewis, Thomas M., 4,987,410, Cl. 340-705.000.

Kaiser, John M.: *See*—
Spadafora, Paul F.; Kaiser, John M.; and Davis, James R., 4,986,475, Cl. 239-218.500.

Kaiser, Klaus P.; Viertel, Lothar; and Welter, Patrick, to Gebr. Happich GmbH. Anti-glare device. 4,986,592, Cl. 296-97.800.

Kaite, Osamu; Yuchi, Takahiro; and Murashima, Hirotsugu, to Sanyo Electric Co., Ltd. Jitter compensation circuit for processing jitter components of reproduced video signal. 4,987,491, Cl. 358-166.000.

Kaji, Makoto; and Hayashi, Nobuyuki, to Hitachi Chemical Co., Ltd. Photoinitiator and photopolymerizable composition using the same. 4,987,057, Cl. 430-281.000.

Kaji, Shinichi: *See*—
Uno, Masaru; Ueda, Kanji; Inoue, Masahiro; and Kaji, Shinichi, 4,986,835, Cl. 55-26.000.

Kajioka, Hideki; Fujita, Yasuhiro; and Fujimura, Keiji, to Fujitsu Ten Limited. Rain sensor with improved avoidance of reflected light. 4,987,296, Cl. 250-222.100.

Kajitani, Koji; and Abe, Minoru, to Kabushiki Kaisha Daikin Seisakusho. Hydraulic clutch releasing means. 4,986,404, Cl. 192-109.00F.

Kajiwara, Kenichi; Mori, Kikuichi; and Ikeda, Hideo, to Ebara Corporation. Pump impeller. 4,986,736, Cl. 416-181.000.

Kakuta, Takuya: *See*—
Oya, Eiichi; Watanabe, Junichi; Kondo, Yasuo; Kakuta, Takuya; Suzuki, Koichi; Nawamaki, Tsutomu; and Watanabe, Shigeomi, 4,986,845, Cl. 71-92.000.

Kamano, Yoshiaki: *See*—
Pettit, George R.; and Kamano, Yoshiaki, 4,986,988, Cl. 424-520.000.

Kamata, Masamoto: *See*—
Masuda, Sadakazu; Fujita, Fumio; Kamata, Masamoto; Yoshini, Masahiko; Ariizumi, Takashi; Okami, Yuji; Takada, Yoshikazu; and Inagaki, Junichi, 4,986,341, Cl. 164-477.000.

Kamei, Mitsuhiro: *See*—
Setoyama, Eiji; and Kamei, Mitsuhiro, 4,986,890, Cl. 204-298.060.

Kamen, Dean L. Drop detection housing with positive tactile signaling. 4,986,821, Cl. 604-251.000.

Kamezawa, Hitoshi: *See*—
Yamanishi, Akio; Kamezawa, Hitoshi; Sakai, Takao; Tsuji, Sadafusa; and Ota, Mitsunobu, 4,986,665, Cl. 356-402.000.

Kamezima, Kohzi: *See*—
Hamada, Tomoyuki; Kamezima, Kohzi; Takeuchi, Ikuo; and Watanabe, Yuriko, 4,987,527, Cl. 364-167.010.

Kamigaito, Osami: *See*—
Mizutani, Tadashi; Fukushima, Yoshiaki; Doi, Haruo; and Kamigaito, Osami, 4,987,106, Cl. 501-147.000.

Kamimura, Minoru: *See*—
Takashio, Masachika; Chikano, Takahide; and Kamimura, Minoru, 4,987,076, Cl. 435-191.000.

Kamiya, Takeshi: *See*—
Koshiba, Yoshikazu; Ikegami, Yuji; Tachino, Noboru; and Kamiya, Takeshi, 4,987,000, Cl. 427-11.000.

Kamiya, Yoshio: *See*—
Fukuyama, Tatsuo; Okada, Toshihiko; Moriguchi, Sanseki; Kamiya, Yoshio; and Ogata, Eisuke, 4,987,113, Cl. 502-338.000.

Kampfer, Helmut; Patzold, Walter; and Mahlberg, Gunther, to Agfa-Gevaert Aktiengesellschaft. Gradation variable black- and -white paper. 4,987,063, Cl. 430-550.000.

Kampmann, Gerhard: *See*—
Reemtsema, Karl-Dieter; Wackermann, Peter; Ahlborn, Guenter; and Kampmann, Gerhard, 4,986,707, Cl. 410-132.000.

Kamyr AB: *See*—
Gullichsen, Johan; Nilsson, Bengt; and Hoglund, Ronny, 4,986,480, Cl. 241-28.000.

Kamyr, Inc.: *See*—
Funk, Erwin D., 4,986,881, Cl. 162-56.000.

Kan, Kojiro; Tomoshige, Toru; and Aoki, Hideya, to Mitsui Petrochemical Industries, Ltd. Imide type prepolymer composition comprising unsaturated bis imide, diamine, and a tertiary butyl hydroquinone polymerization inhibitor. 4,987,214, Cl. 528-317.000.

Kanafani, Hanny; Longan, Bobby J.; Schmidt, Paul R.; and Wisdom, Lawrence W., to Recot, Inc. Method for microwave heating of low moisture food products. 4,987,280, Cl. 219-10.55M.

Kanagawa, Youiti: *See*—
Nakamura, Kiichi; Itakura, Masami; Atsumi, Yasuhiko; Watanabe, Hideo; and Kanagawa, Youiti, 4,987,009, Cl. 427-96.000.

Kanamaru, Yoshihiko; Tokizawa, Minoru; Matsumoto, Masaru; Asaoka, Takemitsu; Matsuda, Hideaki; and Kuraishi, Tadayuki, to SS Pharmaceutical Co., Ltd. 1,3-bis(1,2,4-triazol-1-yl)2-(4-trifluoromethylphenyl)propan-2-ol useful for the prevention and/or treatment of deep-seated mycosis. 4,987,144, Cl. 514-383.000.

Kanayama, Yoshitaka: *See*—
Okuno, Masahiko; and Kanayama, Yoshitaka, 4,986,854, Cl. 106-665.000.

Kanazawa University: *See*—
Bessho, Kazuo, 4,987,398, Cl. 335-299.000.

Kanbe, Toru; Taguchi, Masayuki; and Sato, Katsunobu, to Sanden Corporation. Vending machine using one takeout portion for a conveyor rack and a serpentine rack. 4,986,441, Cl. 221-130.000.

Kandachi, Takayoshi; and Nakamura, Nobuo, to Central Glass Company, Limited. Glass or ceramic plate reinforced with fibrous or flaky material and method of producing same. 4,987,028, Cl. 428-312.600.

Kandetzke, Steven M.: *See*—
Araps, Constance J.; Casey, Jon A.; Divakaruni, Renuka S.; Kandetzke, Steven M.; and Lotsko, Chatherine A., 4,987,211, Cl. 526-251.000.

Kane, Lawrence M.: *See*—
King, Wendell L.; Kane, Lawrence M.; and Adams, Theodore P., 4,986,831, Cl. 623-1.000.

Kaneda, Showzou: *See*—
Maruta, Masamichi; Kaneda, Showzou; Watanabe, Mineo; and Katoh, Etsuko, 4,987,259, Cl. 564-335.000.

Kanegafuchi Kagaku Kogyo Kabushiki Kaisha: *See*—
Uekita, Masakazu; and Awaji, Hiroshi, 4,987,219, Cl. 528-353.000.

Kaneko, Noriaki; Hirata, Yoshimi; and Moriwaki, Masahiro, to Ube Industries, Ltd. Artificial blood vessel and process for preparing it. 4,986,832, Cl. 623-1.000.

Kaneko, Yoshikazu: *See*—
Kutami, Atsushi; and Kaneko, Yoshikazu, 4,987,046, Cl. 430-127.000.

Kanigowski, Voytek: *See*—
Fleury, Jean-Luc P.; Thompson, Jerome W.; and Kanigowski, Voytek, 4,986,733, Cl. 415-230.000.

Kanno, Ippei: *See*—
Ozeki, Hiroaki; Sakashita, Seiji; and Kanno, Ippei, 4,987,606, Cl. 455-188.000.

Kanno, Toshiyuki; and Watanabe, Hitoshi, to Olympus Optical Co., Ltd. Optical information recording medium. 4,987,021, Cl. 428-64.000.

Kansai Paint Co.: *See*—
Shibata, Terukazu; tominaga, Akira; and Hiraki, Tadayoshi, 4,987,178, Cl. 524-547.000.

Kansas State University Research Foundation: *See*—
Posner, Elieser S.; and Li, Yuzhou, 4,986,997, Cl. 426-622.000.

Kanzaki Kokyukoki Mfg. Co., Ltd.: *See*—
Okada, Hideaki, 4,986,073, Cl. 60-454.000.
Kao Corporation: *See*—
Fukasawa, Junichi; Shirakawa, Noriko; and Tsutsumi, Hisao, 4,987,241, Cl. 556-174.000.
Yasuda, Shinichiro; and Inagaki, Yasunori, 4,986,450, Cl. 222-169.000.
Kao, Jar-Lin; Nadler, Murray; Potter, Mark J.; and Martir, Roque V., to Exxon Chemcial Patents Inc. Zeolites for reforming catalysts. 4,987,109, Cl. 502-66.000.
Kapak Corporation: *See*—
Bell, Gary M., 4,986,673, Cl. 383-61.000.
Kapaun, Gustav: *See*—
Dietz, Erwin; Kapaun, Gustav; Kappert, Michael; Prokschy, Frank; Kroh, Adolf; and Urban, Manfred, 4,986,852, Cl. 106-498.000.
Kapolyi, Laszlo : *See*—
Pera, Ferenc; Szentai, Gyorgy; Kesseru, Zsolt; Toth, Peter; and Kapolyi, Laszlo , 4,986,696, Cl. 405-36.000.
Kappert, Michael: *See*—
Dietz, Erwin; Kapaun, Gustav; Kappert, Michael; Prokschy, Frank; Kroh, Adolf; and Urban, Manfred, 4,986,852, Cl. 106-498.000.
Karaki, Koichi: *See*—
Omura, Yasuhiro; Sakai, Mitsugu; Karaki, Koichi; and Sasaki, Yasuo, 4,986,125, Cl. 73-606.000.
Karapita, Alex. Suspension arm. 4,986,506, Cl. 248-280.100.
Karl, Alfons; and von Kienle, Hartmut. Method of preparing a coarse-pored formed carbon. 4,987,116, Cl. 502-427.000.
Karl Mayer Textilmaschinenfabrik: *See*—
Jager, Horst, 4,986,091, Cl. 66-84.00R.
Karolyne, Otta: *See*—
Levente, Szekely; Gabor, Racz; and Karolyne, Otta, 4,987,541, Cl. 364-424.040.
Kasahara, Rikio: *See*—
Mochimaru, Hideaki; Komada, Kenya; Tomita, Masahiro; and Kasahara, Rikio, 4,987,446, Cl. 355-200.000.
Kasahara, Takeshi, to Toko, Inc. Variable capacitance diode element having wide capacitance variation range. 4,987,459, Cl. 357-14.000.
Kashiwabara, Masuo: *See*—
Nakaniwa, Shinpei; and Kashiwabara, Masuo, 4,986,245, Cl. 123-492.000.
Kashiwagi, Kunio: *See*—
Yamada, Kazuyoshi; Kashiwagi, Kunio; and Kurenuma, Tooru, 4,987,356, Cl. 318-578.000.
Kasper, Joseph G., to Tennant Company. Machine configuration and method for steering a vehicle away from a wall. 4,986,378, Cl. 180-6.480.
Katakubo, Kenji: *See*—
Yamazaki, Nobuto; Ushiki, Hiroshi; and Katakubo, Kenji, 4,986,460, Cl. 228-4.500.
Katana Corporation: *See*—
Jensen, Harold A., 4,986,804, Cl. 493-193.000.
Kato, Eiichi: *See*—
Kurono, Masayasu; Yamakawa, Hidehumi; Koshizaka, Takuya; Suzuki, Takehiko; Kato, Eiichi; Iida, Takafumi; Ohishi, Nobuko; and Yagi, Kunio, 4,987,150, Cl. 514-455.000.
Kato, Isao: *See*—
Mori, Eiji; Sonoda, Hidefumi; Hiraku, Akira; Minezawa, Morio; Kato, Isao; and Ito, Koichi, 4,986,840, Cl. 55-316.000.
Kato, Jinichiro: *See*—
Nakamura, Katsuyuki; Yamazaki, Satoru; Kato, Jinichiro; and Tokushige, Kensaku, 4,987,257, Cl. 564-153.000.
Kato, Masahiko: *See*—
Nishii, Michiharu; Mizuno, Genji; Nomura, Yoshihisa; Kato, Masahiko; Shirai, Kenji; and Tanoue, Junichi, 4,986,613, Cl. 303-114.000.
Kato, Nobuhide; and Katsu, Masanori, to NGK Insulators, Ltd. Oxygen sensor. 4,986,892, Cl. 204-427.000.
Kato, Yasuyuki: *See*—
Itoh, Kenichiro; Yamada, Takeshi; Onodera, Tsutomu; Yoshinuma, Mikio; and Kato, Yasuyuki, 4,986,843, Cl. 65-152.000.
Katoh, Etsuko: *See*—
Maruta, Masamichi; Kaneda, Showzou; Watanabe, Mineo; and Katoh, Etsuko, 4,987,259, Cl. 564-335.000.
Katoh, Katsunori: *See*—
Komamura, Tawara; Takiyama, Nobuyuki; and Katoh, Katsunori, 4,987,049, Cl. 430-203.000.
Katoh, Kazunobu: *See*—
Hirano, Shigeo; Katoh, Kazunobu; Inagaki, Yoshio; and Inoue, Nobuaki, 4,987,052, Cl. 430-264.000.
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Komeno, Minoru; Hirao, Motoaki; Takeuchi, Toshiyuki; Nozoe, Shunpei; Takano, Hideki; and Yoshida, Katsunori, 4,986,199, Cl. 110-347.000.
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Keville, Kathleen M.; Le, Quang N.; Mo, Wang-Tsee T.; and Rubin, Mae K., to Mobil Oil Corp. Catalytic hydroisomerization process. 4,986,894, Cl. 208-27.000.

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Kinzenbaw, Jon E., 4,986,367, Cl. 172-126.000.

Kinzenbaw, Jon E., to Kinze Manufacturing, Inc. Folding row marker. 4,986,367, Cl. 172-126.000.

Kirchhoff, Johannes: *See*—
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Kirchner, Peter: *See*—
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Takahashi, Yutaka; Harashima, Ikuo; Nakayama, Shunichi; Arai, Yasuyuki; Takayanagi, Yasushi; Sekiguchi, Ryoichi; Abe, Tomomitsu; and Hayakawa, Hiroshi, 4,986,448, Cl. 222-129.100.

Kirk, Kenneth; Remick, Cassius D.; Burns, Charles M.; and Habicher, Berthold H., to Kirk, Kenneth. Isothermal cooling method and device. 4,986,076, Cl. 62-4.000.

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Kisida, Hirosi; Shuto, Akira; Tamaki, Masahiro; Imahase, Tomotoshi; and Fujimoto, Hiroaki, to Sumitomo Chemical Company, Limited. Acaricidal or insecticidal substituted 1-phenylalkyl benzimidazole compounds. 4,987,145, Cl. 514-394.000.

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Klaus, Hermann: *See*—
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Knobbe, Alan J.; Pintelon, Joseph A. E.; and Pinault, Daniel, to Nordson Corporation. Method and apparatus for coating the interior surface of hollow, tubular articles. 4,987,001, Cl. 427-28.000.
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Kwiatkowski, Patricia L.; and Knowles, David B., 4,986,934, Cl. 252-586.000.
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Kobayashi, Akihiro; Fujita, Toshiyuki; Saito, Takayuki; Kawai, Hiromasa; Hosoi, Yutaka; and Shibata, Hideaki, to Hitachi Chemical Company, Ltd. Lens and optical disc base plate obtained from copolymer of norbornyl (meth)acrylate. 4,986,648, Cl. 351-160.00R.
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Yamazaki, Shunpei; Suzuki, Kunio; Nagayama, Susumu; Inujima, Takashi; Abe, Masayoshi; Fukada, Takeshi; Kinka, Mikio; Kobayashi, Ippei; Shibata, Katsuhiko; Susukida, Masato; and Koyanagi, Kaoru, 4,986,213, Cl. 118-719.000.
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Kobayashi, Tohru: *See*—
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Iwata, Kazuo; Tochihara, Shinichi; and Koike, Shoji, 4,986,850, Cl. 106-25.000.
Koizumi, Yutaka: *See*—
Bannai, Kazunori; Koizumi, Yutaka; and Mamizuka, Mitsuru, 4,987,428, Cl. 346-157.000.
Kojima, Teruhisa: *See*—
Higashitsuji, Ken; Kimoto, Hiroshi; Takahashi, Yasunobu; Kojima, Teruhisa; and Nadehara, Yutaka, 4,987,172, Cl. 524-416.000.
Kokubo, Kakuro: *See*—
Kobayashi, Taiji; Hosogai, Daijiro; Tsurutani, Kazushi; Higashimoto, Noboru; and Kokubo, Kakuro, 4,986,248, Cl. 123-590.000.
Kokubun, Yoshihiro: *See*—
Nitta, Koichi; Nishikawa, Yukie; Ishikawa, Masayuki; Tsuburai, Yasuhiko; and Kokubun, Yoshihiro, 4,987,097, Cl. 437-129.000.
Kollmorgen Corporation: *See*—
Byrne, John V.; McMullin, Francis; and Murray, Aengus, 4,986,124, Cl. 73-317.000.
Komada, Kenya: *See*—
Mochimaru, Hideaki; Komada, Kenya; Tomita, Masahiro; and Kasahara, Rikio, 4,987,446, Cl. 355-200.000.
Komamura, Tawara; Takiyama, Nobuyuki; and Katoh, Katsunori, to Konica Corporation. Image-receiving element for heat transfer type dye image. 4,987,049, Cl. 430-203.000.
Komatsu Dresser Company: *See*—
Voss, Dennis A.; and Gruber, Gary A., 4,986,071, Cl. 60-420.000.
Komatsu, Michio: *See*—
Sato, Goro; Komatsu, Michio; Nishida, Hiroyasu; Tanaka, Yoshichika; Koyanagi, Tsuguo; and Mihara, Kei-ichi, 4,987,012, Cl. 427-221.000.
Komeno, Minoru; Hirao, Motoaki; Takeuchi, Toshiyuki; Nozoe, Shunpei; Takano, Hideki; and Yoshida, Katsunori, to Kawasaki Jukogyo Kabushiki Kaisha; and Kawasaki Steel Corporation. Method for recovering waste gases from coal partial combustor. 4,986,199, Cl. 110-347.000.
Komiya, Kiyoshi; and Nakamura, Yoshimasa, to Takeda Chemical Industries, Ltd. Molding process for fiber reinforced plastics. 4,986,948, Cl. 264-257.000.
Komline-Sanderson Engineering Corporation: *See*—
Goron, John; Renza, Ronald G.; Crosby, Robert J.; and Sodtalbers, Erich W., 4,986,911, Cl. 210-396.000.
Komori, Ryuichi: *See*—
Tozune, Sigeru; Yamazaki, Shizuo; Komori, Ryuichi; Ishii, Masashi; Sakaguchi, Yoshio; and Oda, Tetsuya, 4,987,156, Cl. 521-99.000.
Komossa, Werner, to Korber AG. Shock absorber with variable damping characteristic. 4,986,392, Cl. 188-282.000.
Kondo, Hiroatsu; Yoshikawa, Junichi; and Kawanabe, Tetsuya, to Canon Kabushiki Kaisha. Electronic typewriter having improved paper and ink feed mechanisms selectively driven by a single reversible motor. 4,986,677, Cl. 400-187.000.
Kondo, Masayuki: *See*—
Akimoto, Hirofumi; Takeyama, Sadayuki; Hiki, Toshimichi; and Kondo, Masayuki, 4,986,860, Cl. 156-78.000.
Kondo, Megumu: *See*—
Nishikado, Takashi; Kondo, Megumu; and Murata, Fumiya, 4,987,531, Cl. 364-200.000.
Kondo, Yasuo: *See*—
Oya, Eiichi; Watanabe, Junichi; Kondo, Yasuo; Kakuta, Takuya; Suzuki, Koichi; Nawamaki, Tsutomu; and Watanabe, Shigeomi, 4,986,845, Cl. 71-92.000.
Kondoh, Kihachi: *See*—
Nishino, Yutaro; and Kondoh, Kihachi, 4,986,566, Cl. 280-688.000.
Kondou, Mitsushige: *See*—
Shikama, Shinsuke; Toide, Eiichi; Kondou, Mitsushige; and Iwata, Kazuo, 4,987,566, Cl. 369-122.000.
Konica Corporation: *See*—
Goto, Nobutaka; Koboshi, Shigeharu; Kuramatsu, Masayuki; and Kawamura, Tomonori, 4,987,438, Cl. 354-319.000.
Komamura, Tawara; Takiyama, Nobuyuki; and Katoh, Katsunori, 4,987,049, Cl. 430-203.000.
Konigstein, Dietrich: *See*—
Garbe, Heyno; and Konigstein, Dietrich, 4,986,701, Cl. 408-1.00R.
Kopp, Monte L.: *See*—
Korsunsky, Iosif; Schroepfer, Richard C.; and Kopp, Monte L., 4,986,765, Cl. 439-326.000.

Korber AG: *See*—
Komossa, Werner, 4,986,392, Cl. 188-282.000.
Radzio, Andrzej; and Stems, Wolfgang, 4,986,285, Cl. 131-280.000.
Korea Food Research Institute: *See*—
Yoo, Ick-Jong; Kim, Kyung-Hwan; and Kim, Young-Eon, 4,986,998, Cl. 426-647.000.
Korsunsky, Iosif; Schroepfer, Richard C.; and Kopp, Monte L., to AMP Incorporated. Insertable latch means for use in an electrical connector. 4,986,765, Cl. 439-326.000.
Korwin-Pawlowski, Michael, to General Instrument Corporation. Brazed glass pre-passivated chip rectifier. 4,987,476, Cl. 357-74.000.
Kosco, John: *See*—
Brown, John T.; and Kosco, John, 4,986,748, Cl. 431-188.000.
Koseki, Yasuo; Yamada, Akira; Kurokawa, Hideaki; Ohkouchi, Isao; Ebara, Katsuya; and Takahashi, Sankichi, to Hitachi, Ltd. Apparatus and method of generating coldness. 4,986,079, Cl. 62-59.000.
Koshiba, Yoshikazu; Ikegami, Yuji; Tachino, Noboru; and Kamiya, Takeshi, to Nippon Yakin Kogyo Co., Ltd. Mechanical plating process. 4,987,000, Cl. 427-11.000.
Koshibe, Minoru: *See*—
Kuragano, Morimasa; Iwasaki, Kozo; Isobe, Takeshi; Fukada, Isao; Koshibe, Minoru; Sezaki, Yoshihiro; Segawa, Hirozo; and Yoguchi, Katsuji, 4,987,252, Cl. 562-600.000.
Koshizaka, Takuya: *See*—
Kurono, Masayasu; Yamakawa, Hidehumi; Koshizaka, Takuya; Suzuki, Takehiko; Kato, Eiichi; Iida, Takafumi; Ohishi, Nobuko; and Yagi, Kunio, 4,987,150, Cl. 514-455.000.
Kosmatka, Walter J.; Zalar, Frank E.; and Tener, Dean R., to General Electric Company. Vehicle headlamp. 4,987,343, Cl. 315-82.000.
Kosowsky, Lester H.; and Kubick, Frederick, to United Technologies Corporation. Ferroelectric panel. 4,987,418, Cl. 342-6.000.
Kotaki, Hiroshi, to NEC Corporation. Process of fabricating dynamic random access memory cell. 4,987,091, Cl. 437-52.000.
Kotaki, Toshiroh: *See*—
Sakamoto, Masakatu; Yaguchi, Youichi; Toshima, Hiroaki; and Kotaki, Toshiroh, 4,987,002, Cl. 427-34.000.
Kotzsch, Hans-Joachim: *See*—
Rauleder, Hartwig; Kotzsch, Hans-Joachim; and Vahlensieck, Hans-Joachim, 4,987,268, Cl. 568-616.000.
Kovarik, Kerry M., to Emhart Inc. Screw anchor. 4,986,710, Cl. 411-38.000.
Koyama, Koichi: *See*—
Miyasaka, Tsutomu; and Koyama, Koichi, 4,987,032, Cl. 428-411.100.
Koyama, Satoru: *See*—
Hayashida, Haruo; Kubo, Kouji; Nomura, Ryouichi; and Koyama, Satoru, 4,987,191, Cl. 525-227.000.
Koyanagi, Kaoru: *See*—
Yamazaki, Shunpei; Suzuki, Kunio; Nagayama, Susumu; Inujima, Takashi; Abe, Masayoshi; Fukada, Takeshi; Kinka, Mikio; Kobayashi, Ippei; Shibata, Katsuhiko; Susukida, Masato; and Koyanagi, Kaoru, 4,986,213, Cl. 118-719.000.
Koyanagi, Tadashi: *See*—
Ryu, Ushio; Ono, Hideo; Kabashima, Kengi; Masushige, Yutaka; Matsuo, Teruhiko; and Koyanagi, Tadashi, 4,986,483, Cl. 242-45.000.
Koyanagi, Toru: *See*—
Haga, Takahiro; Yamada, Nobutoshi; Sugi, Hideo; Koyanagi, Toru; and Okada, Hiroshi, 4,987,135, Cl. 514-274.000.
Koyanagi, Tsuguo: *See*—
Sato, Goro; Komatsu, Michio; Nishida, Hiroyasu; Tanaka, Yoshichika; Koyanagi, Tsuguo; and Mihara, Kei-ichi, 4,987,012, Cl. 427-221.000.
Kozel, Emmett L. Blade fuse power tap. 4,986,767, Cl. 439-621.000.
Kozlov, Anatoly V.; Khaimin, Jury F.; Vainshtein, Grigory Y.; and Marakin, Vladimir I., to Nauchno-Proizvodstvennoe Objedinenie Po, etc. Heat engine speed governor. 4,986,237, Cl. 123-352.000.
Kozponti Banyaszati Fejlesztesi Intezet: *See*—
Pera, Ferenc; Szentai, Gyorgy; Kesseru, Zsolt; Toth, Peter; and Kapolyi, Laszlo , 4,986,696, Cl. 405-36.000.
Kraft, Inc.: *See*—
Evans, Neil L.; Tombolato, Aldo L.; Reynolds, Robert R.; and Meisner, Robert J., 4,986,056, Cl. 53-539.000.
Krampe, Josef. Device for removing casings and coatings from glass fiber cables. 4,986,148, Cl. 81-9.400.
Kraus, Stephen A.: *See*—
Abkowitz, Stanley; Rowell, David M.; Heussi, Harold L.; Ludwig, Harold P.; and Kraus, Stephen A., 4,987,033, Cl. 428-469.000.
Krause, Hans; and Stoll, Helmut, to Leybold AG. Method for manufacturing a film resistor. 4,987,010, Cl. 427-103.000.
Kreek, Mary J.; and Fishman, Jack, to Rockefeller University, The. Method for controlling gastrointestinal dysmotility. 4,987,136, Cl. 514-282.000.
Kreisel, Georg: *See*—
Borisch, Fred; and Kreisel, Georg, 4,986,315, Cl. 139-66.00R.
Krenkel, Bernhard; and Joos, Heinz, to F. Oberdorfer GmbH & Co. KG IndustriegewebeTechnik. Seaming machine to manufacture an insertion-type seam for making a cloth belt endless. 4,985,970, Cl. 28-141.000.
Kresge, Edward N.: *See*—
Datta, Sudhin; and Kresge, Edward N., 4,987,200, Cl. 526-75.000.
Kress, Hans-Jurgen: *See*—
Wittmann, Dieter; Lindner, Christian; Damrath, Volker; Kress, Hans-Jurgen; Peters, Horst; and Schoeps, Jochen, 4,987,184, Cl. 525-63.000.
Kroh, Adolf: *See*—
Dietz, Erwin; Kapaun, Gustav; Kappert, Michael; Prokschy, Frank; Kroh, Adolf; and Urban, Manfred, 4,986,852, Cl. 106-498.000.
Krone AG: *See*—
Bramkamp, Wilhelm; and Hegner, Gunter, 4,986,768, Cl. 439-680.000.
Kross, Robert D.: *See*—
Davidson, Eugene A.; and Kross, Robert D., 4,986,990, Cl. 424-665.000.
Krueger, Hans: *See*—
Seunik, Horst; Krueger, Hans; and Weber, Hubert, 4,987,577, Cl. 372-82.000.
Kruppa, Steffen; Buchler, Johann; Schmidt, Manfred; and Prescher, Guenter, to Degussa Aktiengesellschaft. Rhenium-oxo-porphyrin complexes. 4,987,226, Cl. 540-145.000.
Kubick, Frederick: *See*—
Kosowsky, Lester H.; and Kubick, Frederick, 4,987,418, Cl. 342-6.000.
Kubo, Kanji; and Mitobe, Keiichi, to Honda Giken Kogyo Kabushiki Kaisha. Suspension for motor vehicles. 4,986,567, Cl. 280-690.000.
Kubo, Kouji: *See*—
Hayashida, Haruo; Kubo, Kouji; Nomura, Ryouichi; and Koyama, Satoru, 4,987,191, Cl. 525-227.000.
Kubodera, Seiiti: *See*—
Mikoshiba, Hisashi; Tanaka, Mitsugu; and Kubodera, Seiiti, 4,987,120, Cl. 503-227.000.
Kubomoto, Wataru, to Kabushiki Kaisha Kobe Seiko Sho. Hydraulic actuator circuit with flow-joining control. 4,986,072, Cl. 60-421.000.
Kubota, Koichi: *See*—
Saito, Isoo; Sato, Takuji; Kubota, Koichi; and Yamamoto, Masaharu, 4,987,030, Cl. 428-373.000.
Kubota Ltd.: *See*—
Iwamoto, Masatoshi; and Owada, Toshinobu, 4,986,386, Cl. 180-209.000.
Kobayashi, Toshiro; Hiraishi, Hisashi; Hineno, Makoto; Kawata, Tomoshi; Kohara, Yuuji; and Saito, Masaharu, 4,986,181, Cl. 101-348.000.
Shimoie, Shizuo, 4,986,075, Cl. 60-468.000.
Kude, William B., to Honeywell Inc. Self-sterilizing fire-on-the-fly bi-stable safe and arm device. 4,986,184, Cl. 102-256.000.
Kugler, Georg: *See*—
Haessner, Winfried; Kugler, Georg; and Wolf, Robert, 4,986,009, Cl. 34-23.000.
Kuhn S.A.: *See*—
Ermacora, Rino, 4,986,064, Cl. 56-228.000.
Frumholtz, Johnny; and Helfer, Roland, 4,986,061, Cl. 56-6.000.
Kuhnel, Siegfried: *See*—
Nentwig, Jurgen; Scheller, Frieder; Hanke, Gunter; Breitmoser, Wolfgang; Weise, Hartmut; Pfeiffer, Dorothea; Nunchert, Anette; Schubert, Florian; Meiske, Christoph; and Kuhnel, Siegfried, 4,987,075, Cl. 435-182.000.
Kuhnle, William G.; and Murnane, James F., II, to United States of America, Navy. Grenade device. 4,986,185, Cl. 102-388.000.
Kuhtic, Charles E.; and McSwieney, John A. Toss game with target compartment areas. 4,986,549, Cl. 273-402.000.
Kulpinski, Robert W.; and Lubinsky, Anthony R., to Eastman Kodak Company. Telecentric scanning for transparent storage phosphors. 4,987,304, Cl. 250-327.200.
Kumar, Naresh: *See*—
Ford, David A.; Higginbotham, Gordon J. S.; Pugh, David R.; and Kumar, Naresh, 4,986,517, Cl. 266-234.000.
Kumata, Kabsuhiko; Endo, Isao; and Tachikawa, Hitoshi, to Japan Tobacco Inc.; and Tokyo Automatic Machinery Works, Ltd. Method and apparatus for supplying rod-like articles. 4,986,718, Cl. 414-421.000.
Kunii, Nobuaki: *See*—
Watabe, Takashi; Takeyasu, Hiromitsu; Doi, Takao; and Kunii, Nobuaki, 4,987,271, Cl. 568-621.000.
Kunststoff-Technik AG Himmler: *See*—
Himmler, Erich, 4,986,314, Cl. 138-97.000.
Kunze, Brigitte: *See*—
Reichenbach, Hans; Hofle, Gerhard; Augustiniak, Hermann; Bedorf, Norbert; Gerth, Klaus; Irschik, Herbert; Jansen, Rolf; Kunze, Brigitte; Schomburg, Dietmar; Steinmetz, Heinrich; Trowitzsch-Kienast, Wolfram; and Wray, Victor, 4,987,072, Cl. 435-119.000.
Kupchunos, Mary L. Window covering assembly with discrete positioning feature and method of use. 4,986,329, Cl. 160-84.100.
Kuragano, Morimasa; Iwasaki, Kozo; Isobe, Takeshi; Fukada, Isao; Koshibe, Minoru; Sezaki, Yoshihiro; Segawa, Hirozo; and Yoguchi, Katsuji, to Mitsui Toatsu Chemicals, Incorporated; and Kyowa Gas Chemical Industry Co., Ltd. Quenching process of reaction product gas containing methacrylic acid and treatment method of quenched liquid. 4,987,252, Cl. 562-600.000.
Kuraishi, Tadayuki: *See*—
Kanamaru, Yoshihiko; Tokizawa, Minoru; Matsumoto, Masaru; Asaoka, Takemitsu; Matsuda, Hideaki; and Kuraishi, Tadayuki, 4,987,144, Cl. 514-383.000.
Kuramochi, Kazuichi: *See*—
Yamamoto, Hiroshi; Shimazaki, Takeshi; and Kuramochi, Kazuichi, 4,986,848, Cl. 106-1.110.
Kuraray Company, Limited: *See*—
Maeda, Miduho; Takamatsu, Hideo; Ishii, Masao; and Minatono, Shobu, 4,987,194, Cl. 525-314.000.

Kureha Kagaku Kogyo Kabushiki Kaisha: *See—*
Seo, Ikuo; Takahashi, Saburou; and Ohono, Tooru, 4,986,893, Cl. 208-39.000.
Kurematsu, Masayuki: *See—*
Goto, Nobutaka; Koboshi, Shigeharu; Kurematsu, Masayuki; and Kawamura, Tomonori, 4,987,438, Cl. 354-319.000.
Kurenuma, Tooru: *See—*
Yamada, Kazuyoshi; Kashiwagi, Kunio; and Kurenuma, Tooru, 4,987,356, Cl. 318-578.000.
Kurihara, Masaaki: *See—*
Tanigawa, Toru; Kurihara, Masaaki; Fujii, Yasuji; and Inaba, Toshiaki, 4,986,856, Cl. 148-11.50C.
Kurklis, William J.: *See—*
Gibbs, Danny R.; Burgess, Patrick A.; Kurklis, William J.; and Harger, Mark A., 4,987,363, Cl. 324-142.000.
Kurmeier, Hans-Adolf; Weber, Wolf-Dietrich; Radunz, Hans-Eckart; and Schliep, Hans-Jochen, to Merck Patent Gesellschaft Mit Beschrankter Haftung. Salicylic acid derivatives. 4,987,133, Cl. 514-252.000.
Kuroda, Yasuo: *See—*
Nowatari, Hiroyoshi; Hayami, Hiroshi; Kuroda, Yasuo; Yoda, Sumio; and Takahashi, Katsutoshi, 4,987,246, Cl. 556-137.000.
Kuroda, Yoshiki: *See—*
Naito, Takeyuki; Kuroda, Yoshiki; and Yoshida, Hiroshi, 4,986,198, Cl. 110-346.000.
Kurokawa, Hideaki: *See—*
Koseki, Yasuo; Yamada, Akira; Kurokawa, Hideaki; Ohkouchi, Isao; Ebara, Katsuya; and Takahashi, Sankichi, 4,986,079, Cl. 62-59.000.
Kuroki, Yuzuru: *See—*
Fukushima, Yoshihisa; Satoh, Isao; Ichinose, Makoto; Kuroki, Yuzuru; and Takagi, Yuuji, 4,986,668, Cl. 369-59.000.
Kurono, Masayasu; Yamakawa, Hidehumi; Koshizaka, Takuya; Suzuki, Takehiko; Kato, Eiichi; Iida, Takafumi; Ohishi, Nobuko; and Yagi, Kunio, to Kabushiki Kaisha Vitamin Kenkyusho. Agent for inhibiting binding of 5-dihydro-testosterone with androgen receptor as well as process for obtaining same. 4,987,150, Cl. 514-455.000.
Kurotori, Tsuneo: *See—*
Mochizuki, Manabu; Kurotori, Tsuneo; Tsuruoka, Ichiro; Echigo, Katsuhiro; Takenouchi, Hiroaki; and Soga, Setsuo, 4,987,457, Cl. 355-285.000.
Kurz, Arthur A. Affixation of mounting brackets to computer circuit boards. 4,987,517, Cl. 361-417.000.
Kurzel, Iosif; A.: *See—*
Borodin, Fedor N.; Gorfinkel, Solomon I.; and Kurzel, Iosif; A., 4,986,142, Cl. 74-473.00R.
Kushibe, Takahiro; Takano, Yuichi; Tateno, Manabu; Ohno, Eishi; and Shirabe, Naotaka, to Toyota Jidosha Kabushiki Kaisha; and Nippondenso Co., Ltd. Fuel supply device of an engine. 4,986,247, Cl. 123-533.000.
Kusiak, Michael, Jr. Antenna cable ground isolator. 4,987,391, Cl. 333-12.000.
Kutami, Atsushi; and Kaneko, Yoshikazu, to Ricoh Company, Ltd. Electrophotographic photoconductor and method for the preparation thereof. 4,987,046, Cl. 430-127.000.
Kutting, Rolf: *See—*
Schneider, Werner; Borowski, Horst; Kausch, Erwin; Kutting, Rolf; Meyer, Meinhard; Moller, Knut; Muller, Bernd-Henrik; and Schluter, Adolf, 4,986,287, Cl. 131-360.000.
Kuwabara, Isao: *See—*
Suzuki, Takami; Chinomi, Isamu; Tanaka, Yuji; and Kuwabara, Isao, 4,986,509, Cl. 248-396.000.
Kuwata, Satoshi; Sakuta, Koji; and Mori, Shigeru, to Shin-Etsu Chemical Co., Ltd. Method of preparing silicon compositions. 4,987,169, Cl. 524-267.000.
Kuykendall, Jon. Pocket receptacles for writing implements and miscellaneous small articles. 4,986,572, Cl. 281-15.100.
Kuzia, Eugene W.: *See—*
Hutchins, Clinton E.; Kuzia, Eugene W.; Schmidt, Phyllis M.; and Schroeder, Walter W., 4,987,519, Cl. 361-518.000.
Kwiatkowski, Patricia L.; and Knowles, David B., to PPG Industries, Inc. Photochromic compound and articles containing the same. 4,986,934, Cl. 252-586.000.
Kyker, G. Stephen: *See—*
Irby, Richard E.; Kyker, G. Stephen; DiSano, Lorenzo P.; and Alvarez, Eduardo, 4,986,511, Cl. 251-1.300.
Kyowa Gas Chemical Industry Co., Ltd.: *See—*
Kuragano, Morimasa; Iwasaki, Kozo; Isobe, Takeshi; Fukada, Isao; Koshibe, Minoru; Sezaki, Yoshihiro; Segawa, Hirozo; and Yoguchi, Katsuji, 4,987,252, Cl. 562-600.000.
Kyowa Leather Cloth Co., Ltd.: *See—*
Akimoto, Hirofumi; Takeyama, Sadayuki; Hiki, Toshimichi; and Kondo, Masayuki, 4,986,860, Cl. 156-78.000.
Kyushu Electronic Metal Co., Ltd.: *See—*
Yamada, Takayuki; and Kii, Takeshi, 4,986,215, Cl. 118-728.000.
Laboratori Derivati Organici: *See—*
De Ambrosi, Luigi; Recchia, Walter; and Ferrari, Gianni, 4,987,222, Cl. 536-21.000.
Lacotte, Phillipe G. V.; and Smil, Norbert. Flexible mattress including vegetable fibers. 4,985,951, Cl. 5-465.000.
Lacy, James W. Internal combustion engine. 4,986,226, Cl. 123-58.0BC.
Laerum, Ole D., to Nycomed AS. Peptide compounds and medical method of use thereof. 4,987,122, Cl. 514-15.000.
Lafferty, Gerald J., Jr.: *See—*
Livshits, Mikhail; Lafferty, Gerald J., Jr.; and Rempinski, Donald R., 4,986,143, Cl. 74-475.000.
Laganza, Joseph L.; and Engelbrecht, Orest, to SVG Lithography Systems, Inc. Reticle frame assembly. 4,986,007, Cl. 33-621.000.
Lahm, William J.: *See—*
Ashley, Charles R.; Crossman, Russell J.; Hennessy, John P.; and Lahm, William J., 4,986,414, Cl. 206-5.100.
Laht, Daniel J.: *See—*
Lee, Ching-Pang; Venkataramani, Kattalsicheri S.; Laht, Daniel J.; and Lee, Vincent H., 4,986,068, Cl. 60-270.100.
Lait, Leonard G.: *See—*
Carter, David C. M.; Dunckley, Ian; and Lait, Leonard G., 4,986,408, Cl. 198-368.000.
Lake, Jack E., to Lake Monitors, Inc. Flow meter. 4,986,133, Cl. 73-861.580.
Lake Monitors, Inc.: *See—*
Lake, Jack E., 4,986,133, Cl. 73-861.580.
Laky, Tibor; and Fowler, Stewart H., Jr., to Otis Engineering Corporation. System for handling reeled tubing. 4,986,360, Cl. 166-351.000.
Lambot, Honore J., to Diamant Boart Societe Anonyme. Grinding wheel for the smoothing and polishing of glasses. 4,986,035, Cl. 51-109.00R.
Land Infrared Limited: *See—*
Beynon, Thomas G. R., 4,986,672, Cl. 374-131.000.
Landis & GYR Metering, Inc.: *See—*
Gibbs, Danny R.; Burgess, Patrick A.; Kurklis, William J.; and Harger, Mark A., 4,987,363, Cl. 324-142.000.
Landmann, Wolf S.: *See—*
Brosh, Amnon; and Landmann, Wolf S., 4,987,389, Cl. 331-167.000.
Landwehr, Ulrich M. Human topography through photography. 4,987,432, Cl. 354-77.000.
Langlois, Jean C.; Dubie, Gary; and Ratajac, Aleksandar. Portable golf practice swing assembly. 4,986,551, Cl. 273-182.00R.
Lantzsch, Reinhard; and Steinbeck, Karl, to Bayer Aktiengesellschaft. Process for the preparation of trans-2,2-dimethyl-3-(2,2-dichlorovinyl)-cyclopropanecarboxylic acid. 4,987,251, Cl. 562-506.000.
Lanuza, Craig S., to Lanuza, Craig S. Fastening track assembly for fabric wallcoverings. 4,986,332, Cl. 160-327.000.
Lanxide Technology Company, LP: *See—*
LaRoche, E. Allen, Jr., 4,986,945, Cl. 264-60.000.
Lanza, Richard J.: *See—*
Bienert, Walter B.; Jopson, Edward J.; and Lanza, Richard J., 4,986,253, Cl. 126-21.00A.
Laramore, Michael D., to Baldwin/Green Inc. Firefighter's portable water reservoir and method of making the same. 4,986,805, Cl. 493-199.000.
Lardy, Patric: *See—*
Richter, Axel; Lardy, Patric; Schempp, Ulrich; and Glueck, Herbert, 4,986,232, Cl. 123-481.000.
LaRocca, Edward W.; and Andersson, Norman H., to General Dynamics Corporation Air Defense Systems Division, Pomona Facility. High peak pressure notched cartridge case. 4,986,186, Cl. 102-464.000.
LaRoche, E. Allen, Jr., to Lanxide Technology Company, LP. Method for producing mold-shaped ceramic bodies. 4,986,945, Cl. 264-60.000.
Lars Blomdahl AB: *See—*
Blomdahl, Karl, 4,986,829, Cl. 606-188.000.
Larson, Jeffrey G., to Babcock & Wilcox Company, The. Two piece end fitting with hairpin springs. 4,986,960, Cl. 376-446.000.
Laskaris, Evangelos T., to General Electric Company. Refrigerated MR magnet support system. 4,986,078, Cl. 62-51.100.
Laukaitis, Joseph F., to Eastman Kodak Company. Development rate controller. 4,987,453, Cl. 355-246.000.
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Lawson, Richard L., to Product Carousel Inc. Dog chew processing method. 4,985,964, Cl. 452-135.000.
Layer, John C.; and Metcalf, Jeffrey D., to Sundstrand Corporation. Overspeed protection system for aircraft fan engine. 4,986,734, Cl. 416-48.000.
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Leavitt, Joseph. Fish processing unit. 4,985,965, Cl. 17-61.000.
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Ledoux, Patrick R.; and Fourgaut, Luc R., to Pipe Liners, Inc. Pipe liner process. 4,986,951, Cl. 264-516.000.
Lee, Chi-Jen. Vice. 4,986,519, Cl. 269-137.000.
Lee, Ching-Pang; Venkataramani, Kattalaicheri S.; Laht, Daniel J.; and Lee, Vincent H., to General Electric Company. Hypersonic scramjet engine fuel injector. 4,986,068, Cl. 60-270.100.
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Lee, Steven S., to NCR Corporation. Structure and process for forming semiconductor field oxide using a sealing sidewall of consumable nitride. 4,986,879, Cl. 156-649.000.
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Lemoine, Philip G. Ventilated beekeeper suit. 4,985,933, Cl. 2-84.000.
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Leonard, Anne G.; and Verburg, Richard L., to International Business Machines Corporation. Selective processing of a data stream based on font format. 4,987,550, Cl. 364-521.000.
Leonard, Donald A.: *See*—
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Preves, David A.; Rosengren, Brian P.; Holte, James E.; and Leonard, Myer S., 4,986,281, Cl. 128-782.000.
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Leskovec, Robert A.; Davenport, John M.; and Allison, Joseph M., to General Electric Company. Lamp driver circuit. 4,987,347, Cl. 315-209.00R.
Leslie, Robert H., to Panel Technology, Inc. Apparatus for making honeycomb-like paneling. 4,986,871, Cl. 156-494.000.
Leslie, Thomas C., to Plessey Overseas Limited. Analog to digital converters. 4,987,416, Cl. 341-118.000.
Leslie, William O. Erratically movable inflated game ball. 4,986,540, Cl. 273-58.00H.
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Lew, Hyok S. Vortex flowmeter with inertially balanced vortex sensor. 4,986,134, Cl. 73-861.240.
Lewis, David D.: *See*—
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Lewis, Walter M. Combined suitcase and portable ironing board. 4,986,395, Cl. 190-1.000.
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L'Hermite, Pierre; Vergne, Michel; and Escapoulade, Alain, to U.S. Philips Corp. Reversible short-circuit and the use of said short-circuit in a photoelectric tube. 4,987,336, Cl. 313-105.00R.
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Li Bassi, Giuseppe; Nicora, Carlo; Broggi, Fabrizio; and Revelli, Aldo, to Fratelli Lamberti S.p.A. Carbonyl derivatives of 1-phenylindan suitable for use as polymerization photoinitiators, their preparation and use. 4,987,159, Cl. 522-36.000.
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Liken, Peter A.; and Ensing, Steven B., to 501 Venturdyne, Ltd. Carrier for use in testing circuit boards. 4,986,778, Cl. 439-74.000.
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Lina, Jean-Pierre; Pennaneach, Herve ; Ostrowsky, Efrem M.; and Moore, David G., to Pittway Corporation, The. Atomizing pump. 4,986,453, Cl. 222-321.000.
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Linday, Linda A. Infant carrier. 4,986,458, Cl. 224-160.000.
Lindemann, Peer. Hemi-arm sling with abduction control strap. 4,986,266, Cl. 128-94.000.
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Lipsitz, Larry. Blister card set. 4,986,421, Cl. 206-459.000.
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Liu, Dong-Shuei. Adjustable mechanism for a seat back of a stroller. 4,986,564, Cl. 280-642.000.
Livshits, Mikhail; Lafferty, Gerald J., Jr.; and Rempinski, Donald R., to Sparton Corporation. Transmission shift control mechanism with park lock. 4,986,143, Cl. 74-475.000.
Llort, Oscar. Lock with a mechanism for locking and unlocking by means of an electromagnet. 4,986,580, Cl. 292-201.000.
Lo, Peter K. Magnetically controlled exercise bicycle for exercising arms and legs. 4,986,533, Cl. 272-73.000.
Lockhart, Thomas P.; and Burrafato, Giovanni, to Eniricherche S.p.A.; and AGIP S.p.A. Method of removing polymer gels from a petroleum reservoir. 4,986,356, Cl. 166-300.000.
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Login, Robert B.; Merianos, John J.; Dandreaux, Gary; and Shih, Jenn S., to GAF Chemicals Corporation. Polymerizable derivatives of 5-oxo-pyrrolidinecarboxylic acid. 4,987,210, Cl. 526-258.000.
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Lonardi, Emile, to Paul Wurth S.A. Sealing shutter for a shaft furnace. 4,986,516, Cl. 266-87.000.
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Long, David M., Jr., to Alliance Pharmaceutical Corp. Biocompatible, stable and concentrated fluorocarbon emulsions for contrast enhancement and oxygen transport in internal animal use. 4,987,154, Cl. 514-772.000.
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Longcor, Steven W.; Chang, Kuang-Yeh; Lien, Jih-Chang; and Rogers, David M., to Advanced Micro Devices, Inc. Electro-static discharge protection device for CMOS integrated circuit inputs. 4,987,465, Cl. 357-23.130.
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Lowe, Christopher H.; and Allen, Nicholas J. Dispensing device for soluble or dispersible material. 4,986,451, Cl. 222-189.000.
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Luke, Walter, Jr., to WHS Robotics, Inc. Automatic guided vehicle system having communication and traffic controller with unguided paths. 4,987,540, Cl. 364-424.020.
Lund, Earl A. E.; Richard, Robert G.; Shankland, Ian R.; and Wilson, David P., to Allied-Signal Inc. Polyol-blowing agent compositions with improved storage stability. 4,986,930, Cl. 252-182.240.
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MadTech Group, Inc., The: *See*—
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Maeda, Miduho; Takamatsu, Hideo; Ishii, Masao; and Minatono, Shobu, to Kuraray Company, Limited. Block copolymers and composition containing the same. 4,987,194, Cl. 525-314.000.

Maeda, Toyohiro, to Osaka Gas Company Limited. Process for treating coal tar or coal tar pitch. 4,986,895, Cl. 208-39.000.

Maeda, Yuji, to Agency of Industrial Science & Technology, Ministry of International Trade Industry. Anthropomorphic robot arm. 4,986,723, Cl. 414-729.000.

Magami, Masato: *See*—
Hidaka, Yasuhiro; Magami, Masato; Inoue, Takeshi; and Nakane, Sumio, 4,987,148, Cl. 514-441.000.

Magota, Koji; Oshima, Takehiro; and Tanaka, Shoji, to Suntory Limited. Use of a 97 amino acid leader sequence from the *E. coli* B-galactosidase gene for the production of hanp and hptc as fusion proteins. 4,987,070, Cl. 435-69.700.

Maher, Thomas P. Device for facilitating drill bit retrieval. 4,986,375, Cl. 175-323.000.

Mahlberg, Gunther: *See*—
Kampfer, Helmut; Patzold, Walter; and Mahlberg, Gunther, 4,987,063, Cl. 430-550.000.

Mahoney, Fred G. Internal combustion engine injection superheated steam. 4,986,223, Cl. 123-25.00B.

Maier, Karl, to MTU Motoren und Turbinen- Union Munchen GmbH. Support means for the manifold ducts of a heat exchanger. 4,986,344, Cl. 165-67.000.

Maier, Michael: *See*—
Hachtel, Hans; Maier, Michael; and Ehmig, Gerhard, 4,986,709, Cl. 411-30.000.

Majkrzak, David S., to Crary Company. Retractable drift cutter. 4,986,012, Cl. 37-248.000.

Makarov, onstantin A.: *See*—
Mogilevsky, Ilya M.; Vengerov, Igor A.; Gusar, Alexandr G.; Makarov, onstantin A.; and Chebyshev, Alexei E., 4,986,652, Cl. 356-2.000.

Makita Electric Works, Ltd.: *See*—
Fushiya, Fusao; and Okumura, Michio, 4,986,369, Cl. 173-12.000.

Malazgirt, Alp; Padmakumar, Bala; and Bhattacherjee, Arya, to Cypress Semiconductor Corp. Process for improved planarization of the passivation layers for semiconductor devices. 4,986,878, Cl. 156-643.000.

Malinge, Jean; Rabilloud, Guy; and Sillion, Bernard, to Centre d'Etude des Materiaux Organiques pour Technologies Avances (Cemota). Polybenzhydrol compositions ending with ethylenic unsaturated groups, cross-linked polymides resulting from their thermal polyermization and the use of said compositions. 4,987,218, Cl. 528-353.000.

Malm, Marvin F.: *See*—
Gross, Allen E.; and Malm, Marvin F., 4,987,586, Cl. 379-93.000.

Mamizuka, Mitsuru: *See*—
Bannai, Kazunori; Koizumi, Yutaka; and Mamizuka, Mitsuru, 4,987,428, Cl. 346-157.000.

Man-Gill Chemical Company: *See*—
Peters, Donald S., 4,986,977, Cl. 423-592.000.

Manhardt, Paul D.: *See*—
Nitzberg, Leonard R.; and Manhardt, Paul D., 4,986,321, Cl. 141-206.000.

Manni, Charles: *See*—
Chibret, Jean; and Manni, Charles, 4,986,322, Cl. 141-319.000.

Mano, Eiichi: *See*—
Ushijima, Ryosuke; Nakagawa, Susumu; and Mano, Eiichi, 4,987,235, Cl. 548-430.000.

Mano, Seiji: *See*—
Sunahara, Yonehiko; Matsunaga, Makoto; Mano, Seiji; Ohmine, Hiroyuki; and Tsuchiya, Makio, 4,987,421, Cl. 343-700.0MS.

Marakin, Vladimir I.: *See*—
Kozlov, Anatoly V.; Khaimin, Jury F.; Vainshtein, Grigory Y.; and Marakin, Vladimir I., 4,986,237, Cl. 123-352.000.

Marchesano, Carlo, to Minnesota Mining and Manufacturing Company. Concentrated photographic developer composition and method of making it. 4,987,060, Cl. 430-434.000.

Marchese, Lisa N. W.: *See*—
Chang, Tiang-shing; and Marchese, Lisa N. W., 4,986,754, Cl. 433-224.000.

Marcus, Beth; Lawrence, W. Thompson; and Churchill, Philip, to Arthur D. Little, Inc. Hand position/measurement control system. 4,986,280, Cl. 128-774.000.

Marentic, Francis J.; and Morris, Terry L., to Minnesota Mining and Manufacturing. Drag reduction article. 4,986,496, Cl. 244-130.000.

Marie, Gilbert: *See*—
Germanaud, Laurent; Truong Dinh, Nguyen; Marie, Gilbert; and Turello, Patrick, 4,986,924, Cl. 252-51.50A.

Marino, Joseph T., Jr.; and Core, Ronald S., to Motorola, Inc. Secure cryptographic processor arrangement. 4,987,595, Cl. 380-50.000.

Mariol, John V., to Spalding & Evenflo Companies, Inc. Foldable playyard. 4,985,948, Cl. 5-99.100.

Marshall E. Wisner: *See*—
Bowers, Kenneth E., 4,986,351, Cl. 166-85.000.

Marshburn, Hubert L.: *See*—
Harrison, John M.; Marshburn, Hubert L.; and Stout, Ron, deceased, 4,986,113, Cl. 73-49.200.

Martienssen, Robert E.; and Eubank, William J., to Ford Motor Company. Low profile folding seat. 4,986,591, Cl. 296-65.100.

Martin, Emilio B., to Amper, S.A. Document feeder for printing equipment. 4,986,523, Cl. 271-10.000.

Martin, Gordon D., to Aeros Instruments, Inc. Vacuum regulator with antibinding valve stem connector assembly and method. 4,986,298, Cl. 137-15.000.

Martindale, Richard A.: *See*—
Valiyee, Mojtaba; Martindale, William A.; and Martindale, Richard A., 4,986,449, Cl. 222-144.500.

Martindale, William A.: *See*—
Valiyee, Mojtaba; Martindale, William A.; and Martindale, Richard A., 4,986,449, Cl. 222-144.500.

Martinez, Miguel. Fiber optic light transmission apparatus. 4,986,622, Cl. 350-96.150.

Martir, Roque V.: *See*—
Kao, Jar-Lin; Nadler, Murray; Potter, Mark J.; and Martir, Roque V., 4,987,109, Cl. 502-66.000.

Martuscelli, Ezio: *See*—
Ruso, Saverio; Alfonso, Giovanni C.; Pedemonte, Enrico; Turturro, Antonio; and Martuscelli, Ezio, 4,987,189, Cl. 525-183.000.

Martz, Laura: *See*—
Brunetti, Armando; Johnson, Eric; and Martz, Laura, 4,986,050, Cl. 52-488.000.

Marubishi Oil Chemical Co., Ltd.: *See*—
Higashitsuji, Ken; Kimoto, Hiroshi; Takahashi, Yasunobu; Kojima, Teruhisa; and Nadehara, Yutaka, 4,987,172, Cl. 524-416.000.

Maruca, Paul. Fishing fly floating agent and preparation thereof. 4,986,020, Cl. 43-4.000.

Maruta, Masamichi; Kaneda, Showzou; Watanabe, Mineo; and Katoh, Etsuko, to Central Glass Company, Limited. Process of preparing 2,2-bis(4-aminophenyl)-hexafluoropropane. 4,987,259, Cl. 564-335.000.

Marx, Paul: *See*—
Berthold, Werner; Haseler, Helmut; Marx, Paul; Meckl, Heinz; and Ohischlager, Hans, 4,987,059, Cl. 430-428.000.

Masaki, Hisanori; Torii, Kunio; and Suda, Tomio, to Ajinomoto Co., Inc. Compositions useful for the treatment and/or prevention of hepatic disorders, and their pharmaceutical use. 4,987,123, Cl. 514-19.000.

Masaki, Ichiro, to General Motors Corporation. Adaptive motor vehicle cruise control. 4,987,357, Cl. 318-587.000.

Masaki, Yozo, to Jidosha Denki Kogyo Kabushiki Kaisha. Vehicle speed automatic control device. 4,986,385, Cl. 180-179.000.

Maschinenfabrik Andritz Actiengesellschaft: *See*—
Hula, Emil; and Deyer, Johann, 4,986,291, Cl. 134-122.00R.

Mase, Toshiyasu; Hara, Hiromu; Nagaoka, Hitoshi; Takahashi, Takumi; Suzuki, Takeshi; Tomioka, Kenichi; and Yamada, Toshimitsu, to Yamanouchi Pharmaceutical Co., Ltd. Saturated heterocyclic carboxamide derivatives. 4,987,132, Cl. 514-252.000.

Masek, Jiri; Futcher, Ralph J.; and Dixon, James R., to Valmet-Dominion Inc. Apparatus for controlling the load/relief pressures in a calender. 4,986,177, Cl. 100-163.00R.

Mashtare, Dale R.: *See*—
Snelling, Christopher; and Mashtare, Dale R., 4,987,456, Cl. 355-273.000.

Masi, Francesco: *See*—
Calderazzo, Fausto; Pampaloni, Guido; Masi, Francesco; Moalli, Angelo; and Invernizzi, Renzo, 4,987,111, Cl. 502-113.000.

Mason, Chauncey, to A. Ahlstrom Corporation. Sectional screen cylinder. 4,986,900, Cl. 209-397.000.

Massachusetts Institute of Technology: *See*—
Lippman, Andrew B.; and Butera, William J., 4,987,480, Cl. 358-13.000.
Slocum, Alexander H.; and Thurston, Debra, 4,987,526, Cl. 364-167.010.
Walker, Julie L.; and Benton, Stephen A., 4,986,619, Cl. 350-3.610.

Masuda, Masachika: *See*—
Yasuhara, Toshihiro; Masuda, Masachika; Nishimura, Asao; Hatada, Naozumi; Kawai, Sueo; Kitano, Makoto; Miura, Hideo; Yaguchi, Akihiro; and Murakami, Gen, 4,987,474, Cl. 357-70.000.

Masuda, Sadakazu; Fujita, Fumio; Kamata, Masamoto; Yoshini, Masahiko; Ariizumi, Takashi; Okami, Yuji; Takada, Yoshikazu; and Inagaki, Junichi, to Nippon Kokan Kabushiki Kaisha. Process for making non-oriented high silicon steel sheet. 4,986,341, Cl. 164-477.000.

Masumura, Hitoshi: *See*—
Iwaya, Shouichi; Hamada, Munemitsu; and Masumura, Hitoshi, 4,987,515, Cl. 361-321.000.

Masushige, Yutaka: *See*—
Ryu, Ushio; Ono, Hideo; Kabashima, Kengi; Masushige, Yutaka; Matsuo, Teruhiko; and Koyanagi, Tadashi, 4,986,483, Cl. 242-45.000.

Matkan, Josef: *See*—
Coulter, Joseph R., Jr.; and Matkan, Josef, 4,986,211, Cl. 118-644.000.

Matrak, Edgard; and Hess, Robert L., to Strippit Inc. Method and apparatus for the parting and removal of pieces from punch presses. 4,986,153, Cl. 83-25.000.
Matsubara, Akinori, to Casio Computer Co., Ltd. Electronic musical instrument with a fret-split function. 4,986,157, Cl. 84-646.000.
Matsuda, Hideaki: *See—*
Kanamaru, Yoshihiko; Tokizawa, Minoru; Matsumoto, Masaru; Asaoka, Takemitsu; Matsuda, Hideaki; and Kuraishi, Tadayuki, 4,987,144, Cl. 514-383.000.
Matsuda, Hidemi: *See—*
Itou, Takeo; Matsuda, Hidemi; and Tanaka, Hajime, 4,987,338, Cl. 313-478.000.
Matsuda, Norio: *See—*
Nakano, Kazuhiko; Matsuda, Norio; Murase, Mitsutoshi; and Murakami, Hideaki, 4,986,967, Cl. 422-188.000.
Matsuda, Toshiro, to Nissan Motor Co., Ltd. Driving force distribution control system for 4wd vehicle. 4,986,388, Cl. 180-248.000.
Matsufuru, Takayoshi, to AOI Chemical Inc. Sealant injection method and an apparatus therefor. 4,986,862, Cl. 156-94.000.
Matsui, Kunio: *See—*
Fukase, Hisahiko; Matsui, Kunio; Nomura, Akihiro; and Hirata, Atsushi, 4,986,336, Cl. 164-415.000.
Matsui, Masataka: *See—*
Hamano, Takahiro; Matsui, Masataka; and Isobe, Mitsuo, 4,987,560, Cl. 365-200.000.
Matsumoto, Haruo: *See—*
Yorita, Tadahiro; and Matsumoto, Haruo, 4,987,393, Cl. 333-202.000.
Matsumoto, Hiroyuki, to Bridgestone Corporation. Pneumatic tire including sipes. 4,986,325, Cl. 152-209.00R.
Matsumoto, Masaru: *See—*
Kanamaru, Yoshihiko; Tokizawa, Minoru; Matsumoto, Masaru; Asaoka, Takemitsu; Matsuda, Hideaki; and Kuraishi, Tadayuki, 4,987,144, Cl. 514-383.000.
Matsumoto, Tadashi: *See—*
Ikegaya, Isao; Matsumoto, Tadashi; and Sugimoto, Kunihisa, 4,986,514, Cl. 297-362.000.
Matsumoto, Takeshi: *See—*
Kimura, Koichi; Matsumoto, Takeshi; and Otsuka, Fumio, 4,986,676, Cl. 400-124.000.
Matsumura, Shigeru: *See—*
Asada, Eiichi; Yamazoe, Mikio; and Matsumura, Shigeru, 4,986,933, Cl. 252-518.000.
Matsunaga, Fujihisa: *See—*
Yasuhara, Mitsuki; and Matsunaga, Fujihisa, 4,987,260, Cl. 564-402.000.
Matsunaga, Makoto: *See—*
Sunahara, Yonehiko; Matsunaga, Makoto; Mano, Seiji; Ohmine, Hiroyuki; and Tsuchiya, Makio, 4,987,421, Cl. 343-700.0MS.
Matsuo, Norishige: *See—*
Kobayashi, Yukio; Sasaki, Hitoshi; Matsuo, Norishige; and Ohba, Mitsuru, 4,986,995, Cl. 426-412.000.
Matsuo, Teruhiko: *See—*
Ryu, Ushio; Ono, Hideo; Kabashima, Kengi; Masushige, Yutaka; Matsuo, Teruhiko; and Koyanagi, Tadashi, 4,986,483, Cl. 242-45.000.
Matsuoka, Nobuo: *See—*
Ikeda, Yoshinori; Yoshida, Tadashi; Hayashi, Kimiyoshi; Abe, Shunichi; Matsuoka, Nobuo; Akiyama, Mitsuo; and Mita, Yoshinobu, 4,987,484, Cl. 358-75.000.
Matsuoko, Yoshiyuki; Hosaka, Kunio; Takeda, Shigefumi; and Mitsuhashi, Hiroshi, to Tsumura & Co. Novel biphenyl derivative and production and use thereof. 4,987,240, Cl. 549-436.000.
Matsushima, Tadashi; and Saito, Tsutomu, to Kabushiki Kaisha Kawaigakki Seisakusho, Shiz. Electronic musical instrument with data overflow detector and level limited data selection circuit. 4,986,159, Cl. 84-660.000.
Matsushita Electric Industrial Co., Ltd.: *See—*
Fukushima, Yoshihisa; Satoh, Isao; Ichinose, Makoto; Kuroki, Yuzuru; and Takagi, Yuuji, 4,986,668, Cl. 369-59.000.
Noguchi, Naoto; and Shinohara, Isao, 4,987,333, Cl. 310-268.000.
Ozeki, Hiroaki; Sakashita, Seiji; and Kanno, Ippei, 4,987,606, Cl. 455-188.000.
Takahashi, Katsuhiro; Yonezu, Kazuyoshi; Yasuda, Hiroshi; Sano, Ichiro; and Kimura, Toshiaki, 4,986,317, Cl. 141-1.100.
Matsushita Electric Works, Ltd.: *See—*
Iwasaki, Jyuzaemon; Nakano, Hideharu; Tsuno, Masahiro; and Nakamura, Zenichi, 4,985,999, Cl. 30-206.000.
Matsuyama, Takeshi: *See—*
Akiyama, Mamoru; Matsuyama, Takeshi; Yanagida, Yoshiyuki; and Yamashita, Akira, 4,987,186, Cl. 525-107.000.
Mattes, Carl J.: *See—*
Burke, Ronald D.; and Mattes, Carl J., 4,987,318, Cl. 307-443.000.
Mattson, Steven W.: *See—*
Schultz, David H.; Mattson, Steven W.; and Heinz, Donald E., 4,986,513, Cl. 256-65.000.
Mauck, Jack R.: *See—*
Thompson, Thomas K.; and Mauck, Jack R., 4,986,387, Cl. 180-212.000.
Mauthe, Manfred, to Siemens Aktiengesellschaft. Integrated compression amplifier having programmable threshold voltage. 4,987,383, Cl. 330-279.000.
Max-Planck-Gesellschaft . . . e.V.: *See—*
Meijer, Gerard; Andresen, Peter; Meier, Gerd E. A.; and Luelf, Hans W., 4,986,654, Cl. 356-43.000.
Max Planck-Gesellschaft Zur Forderung der Wissenschaften E.V.: *See—*
Epplen, Jorg T., 4,987,066, Cl. 435-6.000.
Mayall, George W.: *See—*
Hopkinson, Philip J.; and Mayall, George W., 4,987,511, Cl. 361-35.000.
Mayo Foundation For Medical Education and Research: *See—*
Riederer, Stephen J.; and Farzaneh, Farhad, 4,986,272, Cl. 128-653.00A.
Mazur, Richard J.: *See—*
Wood, James A.; and Mazur, Richard J., 4,987,543, Cl. 364-426.030.
Mazzarantani, Renato E. Method and apparatus for installing a curtain wall. 4,986,046, Cl. 52-235.000.
McArdle, Kristin: *See—*
Brueck, Steven R. J.; Soares, Schubert; McArdle, Kristin; and Mullins, Bill W., 4,987,461, Cl. 357-19.000.
McBride, Donald G.; and Ellis, Theron L., to International Business Machines Corporation. Flexible carrier for an electronic device. 4,987,100, Cl. 437-206.000.
McBride, Edward F.: *See—*
Casad, Burton M.; Clark, Charles R.; Cantu, Lisa A.; Cords, D. Philip; and McBride, Edward F., 4,986,355, Cl. 166-295.000.
Clark, Charles R.; Whitfill, Donald L.; Cords, D. Philip; McBride, Edward F.; and Bellis, Harold E., 4,986,353, Cl. 166-279.000.
McCain Manufacturing Corp.: *See—*
Bulka, Raymond I.; and Higgins, George D., 4,986,521, Cl. 270-54.000.
McCann, Gerald P.; and Holoubek, Andrew J., to McCann's Engineering and Manufacturing, Co. Beverage distribution system. 4,986,447, Cl. 222-129.100.
McCann's Engineering and Manufacturing, Co.: *See—*
McCann, Gerald P.; and Holoubek, Andrew J., 4,986,447, Cl. 222-129.100.
McCarter, Mary Ann K. Storage tube assemblies for rolled sheets. 4,986,431, Cl. 220-23.200.
McConkey, Laura P., to University of Delaware. Psychologically stimulating changing apparatus. 4,986,617, Cl. 312-237.000.
McCurry, Patrick M.: *See—*
Pickens, Carl; and McCurry, Patrick M., 4,987,225, Cl. 536-124.000.
McDonald, Norman J., Jr. Stabilizer for reducing the effect resulting from firing a firing weapon. 4,986,018, Cl. 42-1.060.
McDonnell Douglas Corporation: *See—*
Blackmon, James B.; Cady, Edwin C.; and Jones, Nelson E., 4,986,346, Cl. 165-86.000.
Speakman, Eugene R., 4,985,979, Cl. 29-512.000.
McEvoy, Joe: *See—*
Glaros, Timothy L.; Soissons, Florent; and McEvoy, Joe, 4,986,992, Cl. 426-19.000.
McGaffigan, Thomas H.; Derbyshire, Rodney L.; and Wilkerson, Douglas, to Metcal, Inc.; and AMP Incorporated, a part interest. Heater straps. 4,987,291, Cl. 219-549.000.
McGee, Dennis E.; and Hallen, Ted S., to Union Oil Company of California. Synthesis of hydroxy sulfonic acids. 4,987,250, Cl. 562-118.000.
McGinnis, Michael J. Mat cutting device. 4,986,156, Cl. 83-467.100.
McGonagle, Patrick E. Privacy booth. 4,986,330, Cl. 160-135.000.
McGrew, Gordon N.: *See—*
Yatka, Robert; Prombo, Patrick; Barabolak, Roman M.; Zibell, Steven; and McGrew, Gordon N., 4,986,991, Cl. 426-3.000.
McGuire, James T.: *See—*
Milliser, John S.; and McGuire, James T., 4,985,978, Cl. 29-511.000.
McKee, Michael J.: *See—*
Beinhaur, Ernest L.; Henschen, Homer E.; McKee, Michael J.; and Pawlikowski, Joseph M., 4,987,283, Cl. 219-85.110.
McKinney, Kevin D., to Boeing Company, The. Fastener collar remover. 4,986,702, Cl. 408-54.000.
McMahon, Michael J., to Zip-Pak Incorporated. Fill tube spreader. 4,986,054, Cl. 53-451.000.
McMarlin, Robert M., to Pittsburgh Corning Corporation. Method and apparatus for erecting a glass block wall. 4,986,048, Cl. 52-306.000.
McMath, Jack A.: *See—*
Kesterman, James E.; and McMath, Jack A., 4,986,320, Cl. 141-198.000.
McMordie, James R.: *See—*
Young, Harold R.; McSpadden, John S.; McMordie, James R.; and Smith, Leon B., 4,986,445, Cl. 222-71.000.
McMullin, Francis: *See—*
Byrne, John V.; McMullin, Francis; and Murray, Aengus, 4,986,124, Cl. 73-317.000.
McNew, Donald W., to Leggett & Platt, Incorporated. Security file cabinet. 4,986,589, Cl. 296-37.800.
McNicol, John D.: *See—*
Wu, Kuang-Tsan; and McNicol, John D., 4,987,375, Cl. 329-309.000.
McSpadden, John S.: *See—*
Young, Harold R.; McSpadden, John S.; McMordie, James R.; and Smith, Leon B., 4,986,445, Cl. 222-71.000.
McSwieney, John A.: *See—*
Kuhtic, Charles E.; and McSwieney, John A., 4,986,549, Cl. 273-402.000.
McWhorter, Charles E. Packaged pre-cut dental floss product. 4,986,289, Cl. 132-323.000.
Mechtersheimer, Gunter: *See—*
Hirth, Michael; and Mechtersheimer, Gunter, 4,986,968, Cl. 422-186.190.

Meckelburg, Hans J.: *See*—
Rothmann, Werner; and Meckelburg, Hans J., 4,986,114, Cl. 73-117.000.
Meckl, Heinz: *See*—
Berthold, Werner; Haseler, Helmut; Marx, Paul; Meckl, Heinz; and Ohischlager, Hans, 4,987,059, Cl. 430-428.000.
Spriewald, Erika; Tappe, Gustav; and Meckl, Heinz, 4,987,058, Cl. 430-372.000.
Medical & Scientific Enterprises, Inc.: *See*—
O'Neill, William; and Warne, James R., 4,986,273, Cl. 128-653.00R.
Mediolanum Farmaceutici Spl: *See*—
De Ambrosi, Luigi; Recchia, Walter; and Ferrari, Gianni, 4,987,222, Cl. 536-21.000.
Meffert, Peter; Schwarz, Heinrich; and Patzer, Juergen, to Dr. Ing. h.c.F. Porsche AG. Four-wheel locking system for a motor vehicle. 4,986,800, Cl. 475-113.000.
Mehta, Hemang S., to Chrysler Corporation. Method of engine model determination for use in an electronically-controlled automatic transmission. 4,986,145, Cl. 74-843.000.
Meier, Gerd E. A.: *See*—
Meijer, Gerard; Andresen, Peter; Meier, Gerd E. A.; and Luelf, Hans W., 4,986,654, Cl. 356-43.000.
Meier, Robert H.; Seel, Jerry E.; and Gray, Gary W., to Camp International, Inc. Computerized biomechanical analysis system. 4,986,534, Cl. 272-96.000.
Meijer, Gerard; Andresen, Peter; Meier, Gerd E. A.; and Luelf, Hans W., to Max-Planck-Gesellschaft . . . e.V. Method and apparatus for contactless acquisition of data for the locally resolved determination of the density and temperature in a measurement volume. 4,986,654, Cl. 356-43.000.
Meintzer, John C., Jr.; and Chandler, Michael E., to Dundee Mills, Inc. Label injector for hemming machines. 4,986,524, Cl. 271-100.000.
Meiske, Christoph: *See*—
Nentwig, Jurgen; Scheller, Frieder; Hanke, Gunter; Breitmoser, Wolfgang; Weise, Hartmut; Pfeiffer, Dorothea; Nunchert, Anette; Schubert, Florian; Meiske, Christoph; and Kuhnel, Siegfried, 4,987,075, Cl. 435-182.000.
Meisner, Robert J.: *See*—
Evans, Neil L.; Tombolato, Aldo L.; Reynolds, Robert R.; and Meisner, Robert J., 4,986,056, Cl. 53-539.000.
Meissner, P. Scott: *See*—
Berman, Michael L.; Meissner, P. Scott; and Sisk, William P., 4,987,073, Cl. 435-172.300.
Meister, Donald F., to Target Products Inc. Roadway grooving apparatus. 4,986,604, Cl. 299-39.000.
Mele, Antonio: *See*—
Grandi, Guido; Mele, Antonio; Colletti, Elisabetta; Campagnoli, Susanna; and Nogarotto, Renzo, 4,987,078, Cl. 435-231.000.
Melendy, Peter S. Glue stick and applicator. 4,986,680, Cl. 401-1.000.
Melton, M. Shannon: *See*—
Pickell, Frank W.; Varesic, John Z.; Melton, M. Shannon; and Melton, Sidney H., 4,986,222, Cl. 122-6.00R.
Melton, Sidney H.: *See*—
Pickell, Frank W.; Varesic, John Z.; Melton, M. Shannon; and Melton, Sidney H., 4,986,222, Cl. 122-6.00R.
Memmel, Ferdinand: *See*—
Dietz, Erwin; Munkel, Albert; and Memmel, Ferdinand, 4,986,851, Cl. 106-503.000.
Merbabu Corporation: *See*—
Okuno, Masahiko; and Kanayama, Yoshitaka, 4,986,854, Cl. 106-665.000.
Merchant, Abid N., to Du Pont de Nemours, E. I., and Company. Binary azeotropic compositions of 1-chloro-1,2,2-trifluorocyclobutane and methanol. 4,986,928, Cl. 252-171.000.
Merck & Co., Inc.: *See*—
Chen, Shieh-Shung T.; Wicker, Linda S.; and Arison, Byron H., 4,987,139, Cl. 514-321.000.
Merck Patent Gesellschaft mit beschrankter Haftung: *See*—
Eidenschink, Rudolf; Haas, Gunther; Pohl, Ludwig; Romer, Michael; Scheuble, Bernhard; and Weber, Georg, 4,986,931, Cl. 252-299.630.
Kieser, Manfred, 4,986,853, Cl. 106-504.000.
Kurmeier, Hans-Adolf; Weber, Wolf-Dietrich; Radunz, Hans-Eckart; and Schliep, Hans-Jochen, 4,987,133, Cl. 514-252.000.
Merianos, John J.: *See*—
Login, Robert B.; Merianos, John J.; Dandreaux, Gary; and Shih, Jenn S., 4,987,210, Cl. 526-258.000.
Merrow, Thomas E.: *See*—
Stults, Robert A.; Harrison, Steven R.; Merrow, Thomas E.; Laursen, Jane J.; Goodman, George O.; Trow, Jay; and Abel, Mark J., 4,987,492, Cl. 358-181.000.
Meshulam, Yair. Apparatus for heating and cooling liquids. 4,986,342, Cl. 165-40.000.
Messinger, Robert M.: *See*—
Tobias, Samuel; and Messinger, Robert M., 4,985,943, Cl. 4-542.000.
Metcal, Inc.: *See*—
McGaffigan, Thomas H.; Derbyshire, Rodney L.; and Wilkerson, Douglas, 4,987,291, Cl. 219-549.000.
Metcalf, Jeffrey D.: *See*—
Layer, John C.; and Metcalf, Jeffrey D., 4,986,734, Cl. 416-48.000.
Metzger, Kai, to Stahlgruber Otto Gruber GmbH & Co. Tire mounting device. 4,986,328, Cl. 157-1.240.
Meurer, Charles L., to Baker Hughes Incorporated. Tape drive with self-expanding coils for sludge collector. 4,986,141, Cl. 74-89.220.
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Meyer, Dolph A.; and Sardjono, Wyatmodjo. Roof truss and beam therefor. 4,986,051, Cl. 52-738.000.
Meyer, Hermann; and Ernst, Alfons, to Dr. Johannes Heidenhain GmbH. Photoelectric angle-measuring apparatus whose optically projecting focal line coincides with the axis of rotation of the scale carrier. 4,987,302, Cl. 250-231.140.
Meyer, Meinhard: *See*—
Schneider, Werner; Borowski, Horst; Kausch, Erwin; Kutting, Rolf; Meyer, Meinhard; Moller, Knut; Muller, Bernd-Henrik; and Schluter, Adolf, 4,986,287, Cl. 131-360.000.
Meyers, Hillel A.: *See*—
Most, Steven B.; Meyers, Hillel A.; Dunsmore, Susanne L.; and Blanchette, Jeffrey J., 4,987,599, Cl. 381-107.000.
Michel-Kim, Herwig. Method for producing generator gas and activated carbon from solid fuels. 4,987,115, Cl. 502-419.000.
Micron Technology, Inc.: *See*—
Roberts, Ceredig, 4,987,089, Cl. 437-34.000.
Middelburg Steel and Alloys (Proprietary) Limited: *See*—
Hewitt, Jack, 4,986,857, Cl. 148-12.0EA.
Mihara, Kei-ichi: *See*—
Sato, Goro; Komatsu, Michio; Nishida, Hiroyasu; Tanaka, Yoshichika; Koyanagi, Tsuguo; and Mihara, Kei-ichi, 4,987,012, Cl. 427-221.000.
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Fujimura, Shuzo; Mihara, Satoru; Kisa, Toshimasa; and Motoki, Yasunari, 4,987,284, Cl. 219-121.430.
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Mikkelson, James D. Apparatus for clearing frozen water lines. 4,986,311, Cl. 138-35.000.
Mikoshiba, Hisashi; Tanaka, Mitsugu; and Kubodera, Seiiti, to Fuji Photo Film Co., Ltd. Thermosensitive transfer material. 4,987,120, Cl. 503-227.000.
Mikuni Kogyo Kabushiki Kaisha: *See*—
Muraji, Tetsuo; and Sekiya, Mitsuru, 4,986,240, Cl. 123-452.000.
Miller, Bradley J.; and Patten, Donald O., Jr., to Norton Company. Ceramic joints. 4,987,035, Cl. 428-599.000.
Miller, Jack V. Lamp shade with improved optical efficiency. 4,987,524, Cl. 362-355.000.
Miller, Keith E. J., to Seamark Systems Limited. Marine antifouling. 4,987,036, Cl. 428-626.000.
Miller, Marion E. Knee brace. 4,986,264, Cl. 128-80.00C.
Miller, Meryl E.; Nopper, Leroy N.; and Lewis, David D., to Lucas Duralith Corporation. Multi-pole momentary membrane switch. 4,987,275, Cl. 200-5.00A.
Miller, Stephen H.: *See*—
Pagano, Daniel M.; and Miller, Stephen H., 4,987,437, Cl. 354-275.000.
Miller, Terry L.; Zdanis, William R., Jr.; Woerner, Graham A.; and Horn, Allen F., III, to Rogers Corporation. Coaxial cable insulation and coaxial cable made therewith. 4,987,274, Cl. 174-102.00R.
Milliser, John S.; and McGuire, James T., to Textron Inc. Method for assembling a self-clinching fastening structure. 4,985,978, Cl. 29-511.000.
Mills, Richard L. Bag sealer and cutter. 4,986,000, Cl. 30-278.000.
Mims, Michael: *See*—
Mueller, Mark D.; Jones, Frank; Quintana, Julio; Ruddy, Kenneth E.; and Mims, Michael, 4,986,361, Cl. 166-381.000.
Minari, Katsunobu: *See*—
Naruse, Nobutaka; Hirano, Akihiko; and Minari, Katsunobu, 4,986,083, Cl. 62-157.000.
Minatono, Shobu: *See*—
Maeda, Miduho; Takamatsu, Hideo; Ishii, Masao; and Minatono, Shobu, 4,987,194, Cl. 525-314.000.
Minezawa, Morio: *See*—
Mori, Eiji; Sonoda, Hidefumi; Hiraku, Akira; Minezawa, Morio; Kato, Isao; and Ito, Koichi, 4,986,840, Cl. 55-316.000.
Ministry of International Trade & Industry: *See*—
Okazaki, Yuichi, 4,986,150, Cl. 82-137.000.
Minnesota Mining and Manufacturing: *See*—
Marentic, Francis J.; and Morris, Terry L., 4,986,496, Cl. 244-130.000.
Minnesota Mining and Manufacturing Company: *See*—
Berger, Thomas W., 4,986,667, Cl. 366-173.000.
Bossard, Ronald G., 4,986,626, Cl. 350-96.200.
Keith, Roger H., 4,986,762, Cl. 439-131.000.
Marchesano, Carlo, 4,987,060, Cl. 430-434.000.
Petersen, Kurt H.; and Rios, Juan P., 4,986,760, Cl. 439-71.000.
Vanderwerf, Dennis F., 4,986,651, Cl. 353-66.000.
Windorski, David C., 4,986,440, Cl. 221-45.000.
Mino, Masayuki: *See*—
Yamada, Osamu; and Mino, Masayuki, 4,987,450, Cl. 355-228.000.
Minolta Camera Kabushiki Kaisha: *See*—
Hikosaka, Akihiro; Sakai, Hitoshi; Yoshihara, Takayoshi; and Asakura, Naoichi, 4,987,451, Cl. 355-245.000.
Hirota, Yoshihiko, 4,987,485, Cl. 358-80.000.
Nakagawa, Shuichi; Murasaki, Hiroshi; Ikegawa, Akihito; Etou, Kouichi; and Mizuno, Hiroshi, 4,987,452, Cl. 355-245.000.
Natsuhara, Toshiya; Enoguchi, Yuji; Mizuno, Hiroshi; Anno, Masahiro; and Machida, Junji, 4,987,454, Cl. 355-259.000.
Yamada, Osamu; and Mino, Masayuki, 4,987,450, Cl. 355-228.000.
Yamanishi, Akio; Kamezawa, Hitoshi; Sakai, Takao; Tsuji, Sadafusa; and Ota, Mitsunobu, 4,986,665, Cl. 356-402.000.

Mintz, David; and Olshansky, Leonard, to Machine Design Systems, Inc. Cushion compression machine for compressing a cushion and applying a cover to the cushion. 4,986,055, Cl. 53-526.000.
Misawa, Masayuki, to Asahi Kogaku Kogyo Kabushiki Kaisha. Camera image plane sizer control device. 4,987,436, Cl. 354-203.000.
Mischler, Gilbert, to Bobst SA. Device for controlling the opening of an ink fountain of a printing machine. 4,986,180, Cl. 101-365.000.
Miskin, Michael J.: *See*—
Leonard, Russell J.; Miskin, Michael J.; and Schroll, Ross E., 4,986,766, Cl. 439-352.000.
Mistrater, Alan B.: *See*—
Hendrix, Loren E.; and Mistrater, Alan B., 4,986,941, Cl. 264-13.000.
Mita Industrial Co., Ltd.: *See*—
Uemori, Satoshi, 4,987,442, Cl. 355-50.000.
Mita, Yoshinobu: *See*—
Ikeda, Yoshinori; Yoshida, Tadashi; Hayashi, Kimiyoshi; Abe, Shunichi; Matsuoka, Nobuo; Akiyama, Mitsuo; and Mita, Yoshinobu, 4,987,484, Cl. 358-75.000.
Mitobe, Keiichi: *See*—
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Mitsubishi Denki Kabushiki Kaisha: *See*—
Ikeno, Masahiko, 4,987,477, Cl. 357-75.000.
Inamiya, Kenichi, 4,987,420, Cl. 342-457.000.
Ishii, Toshihiko, 4,987,352, Cl. 318-254.000.
Kobayashi, Kiyoteru; Nishimura, Tadashi; Morita, Hiroshi; Nakao, Shuji; Oda, Hidekazu; and Inoue, Yasuo, 4,987,092, Cl. 437-57.000.
Morishita, Akira; and Isozumi, Shuzoo, 4,986,140, Cl. 74-7.00C.
Morishita, Mitsuharu, 4,986,379, Cl. 180-79.100.
Morishita, Mitsuharu, 4,986,380, Cl. 180-79.100.
Morishita, Mitsuharu; and Yasukawa, Takeshi, 4,986,381, Cl. 180-79.100.
Ohmori, Toshiaki; and Fukumoto, Takaaki, 4,986,216, Cl. 118-730.000.
Saitoh, Kimio, 4,987,359, Cl. 318-625.000.
Sato, Hiroshi; Utsui, Yoshihiko; Ikeda, Hideo; and Hamamura, Chiyo, 4,986,137, Cl. 73-862.360.
Shikama, Shinsuke; Toide, Eiichi; Kondou, Mitsushige; and Iwata, Kazuo, 4,987,566, Cl. 369-122.000.
Sunahara, Yonehiko; Matsunaga, Makoto; Mano, Seiji; Ohmine, Hiroyuki; and Tsuchiya, Makio, 4,987,421, Cl. 343-700.0MS.
Tsukagoshi, Kazuo, 4,987,483, Cl. 358-64.000.
Umezaki, Tomokazu, 4,985,984, Cl. 29-602.100.
Yamanouchi, Masahide; and Mori, Tetsuro, 4,987,384, Cl. 330-286.000.
Zumoto, Nobuyuki; Takahama, Toru; Hoshinouchi, Susumu; and Morita, Noriko, 4,986,214, Cl. 118-722.000.
Mitsubishi Gas Chemical Company, Inc.: *See*—
Ebata, Shuji; Hirayama, Hiroyuki; and Uchiyama, Takako, 4,987,256, Cl. 564-126.000.
Mitsubishi Jidosha Kogyo Kabushiki Kaisha: *See*—
Anzue, Kaoru; Isomoto, Jun; and Takei, Nobuo, 4,986,552, Cl. 277-38.000.
Mitsubishi Jukogyo Kabushiki Kaisha: *See*—
Kobayashi, Toru; and Sonohara, Tsunetoshi, 4,986,144, Cl. 74-606.00R.
Mitsubishi Kasei Corporation: *See*—
Suzuki, Tetsumi; Murayama, Tetsuo; Ono, Hitoshi; and Ando, Osamu, 4,987,045, Cl. 430-59.000.
Mitsubishi Petrochemical Company Limited: *See*—
Gotoh, Shiroh, 4,987,193, Cl. 525-313.000.
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Ishida, Yuzuru; Mitsuboshi, Masahiro; Inoue, Haruo; Otsuka, Ichiro; and Iio, Keiji, 4,987,170, Cl. 524-267.000.
Mitsuhashi, Hiroshi: *See*—
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Mitsui Petrochemical Industries, Ltd.: *See*—
Kan, Kojiro; Tomoshige, Toru; and Aoki, Hideya, 4,987,214, Cl. 528-317.000.
Shiraki, Takeshi; and Nakashima, Koji, 4,987,025, Cl. 428-220.000.
Suzuki, Goro; and Seiji, Matsuura, 4,987,205, Cl. 528-104.000.
Torihata, Takashi; and Nisimura, Satoyuki, 4,986,898, Cl. 208-251.00R.
Yasuhara, Mitsuki; and Matsunaga, Fujihisa, 4,987,260, Cl. 564-402.000.
Mitsui Toatsu Chemicals, Incorporated: *See*—
Gohbara, Masatoshi; Asano, Tamotsu; Ozawa, Shuji; Yamazaki, Hideo; Ishii, Tsutomu; Nishida, Makoto; Watanabe, Junko; and Sato, Naoki, 4,986,846, Cl. 71-92.000.
Ishida, Yuzuru; Mitsuboshi, Masahiro; Inoue, Haruo; Otsuka, Ichiro; and Iio, Keiji, 4,987,170, Cl. 524-267.000.
Izukawa, Tsukuru; Ikado, Shuhei; and Enomoto, Toshiyuki, 4,987,198, Cl. 525-491.000.
Kuragano, Morimasa; Iwasaki, Kozo; Isobe, Takeshi; Fukada, Isao; Koshibe, Minoru; Sezaki, Yoshihiro; Segawa, Hirozo; and Yoguchi, Katsuji, 4,987,252, Cl. 562-600.000.
Ohta, Masahiro; Kawashima, Saburo; Iiyama, Katsuaki; Tamai, Shoji; Oikawa, Hideaki; and Yamaguchi, Akihiro, 4,987,197, Cl. 525-436.000.
Yamaguchi, Keizaburo; Ooe, Masayuki; and Yamaguchi, Akihiro, 4,987,261, Cl. 564-428.000.
Yamaya, Norimasa; Ohta, Masahiro; and Yamaguchi, Akihiro, 4,987,207, Cl. 528-170.000.
Miura, Hideo: *See*—
Yasuhara, Toshihiro; Masuda, Masachika; Nishimura, Asao; Hatada, Naozumi; Kawai, Sueo; Kitano, Makoto; Miura, Hideo; Yaguchi, Akihiro; and Murakami, Gen, 4,987,474, Cl. 357-70.000.
Miyachi, Takumi: *See*—
Sato, Hozumi; Shimada, Humito; Sakaguchi, Akio; Takemura, Yasuhiko; Nishi, Tadaaki; Ono, Hisao; Nagano, Masanobu; and Miyachi, Takumi, 4,987,017, Cl. 428-36.800.
Miyagawa, Ichirou: *See*—
Horikawa, Kazuo; Miyagawa, Ichirou; and Okada, Kouichi, 4,986,634, Cl. 350-174.000.
Miyamae, Yusuke: *See*—
Tomisawa, Yoshiaki; Satou, Tadaji; Hayashi, Nobuyuki; and Miyamae, Yusuke, 4,986,869, Cl. 156-250.000.
Miyano, Takayuki; and Nii, Shinsuke, to Kabushiki Kaisha Toyoda Jidoshokki Seisakusho. Illumination device and roof member for a forklift. 4,987,522, Cl. 362-74.000.
Miyaoka, Satoshi, to Kabushiki Kaisha Kobe Seiko Sho. Hydraulic shovel control circuit with operating pattern switching valve. 4,986,165, Cl. 91-529.000.
Miyasaka, Tsutomu; and Koyama, Koichi, to Fuji Photo Film Co., Ltd. Functional organic thin film and method of manufacture thereof. 4,987,032, Cl. 428-411.100.
Miyauchi, Mayu; and Kobayashi, Satoru, to NEC Corporation. Semiconductor memory device having a plurality of access ports. 4,987,559, Cl. 365-189.040.
Miyazawa, Kenichi, to Nippon Steel Corporation. Process and apparatus for continuous sheet casting by twin rolls. 4,986,339, Cl. 164-466.000.
Miyazawa, Yasuhiro: *See*—
Aoki, Kunimitsu; Miyazawa, Yasuhiro; Ichikawa, Hiroshi; and Furuya, Yoshiyuki, 4,986,631, Cl. 350-112.000.
Mizukusa, Yasuyuki: *See*—
Yamauchi, Noriyoshi; Ishida, Hitoshi; Kawai, Kazuaki; and Mizukusa, Yasuyuki, 4,986,338, Cl. 164-457.000.
Mizumori, Takashi: *See*—
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Mizumura, Yoshinori: *See*—
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Mizuno, Hiroshi: *See*—
Nakagawa, Shuichi; Murasaki, Hiroshi; Ikegawa, Akihito; Etou, Kouichi; and Mizuno, Hiroshi, 4,987,452, Cl. 355-245.000.
Natsuhara, Toshiya; Enoguchi, Yuji; Mizuno, Hiroshi; Anno, Masahiro; and Machida, Junji, 4,987,454, Cl. 355-259.000.
Mizuno, Naohito: *See*—
Nishida, Minoru; Mizuno, Naohito; Hattori, Tadashi; Huzino, Seizi; and Ando, Yoshiyasu, 4,986,861, Cl. 156-89.000.
Mizutani, Masato: *See*—
Sirosita, Masao; Mizutani, Masato; Kimura, Shigeko; Oguri, Yukio; Kitamura, Masaru; Umada, Youichi; and Sato, Hiroshi, 4,986,989, Cl. 424-635.000.
Mizutani, Tadashi; Fukushima, Yoshiaki; Doi, Haruo; and Kamigaito, Osami, to Kabushiki Kaisha Toyota Chuo Kenkyusho. Process for producing clay mineral of chain structure. 4,987,106, Cl. 501-147.000.
Mo, Wang-Tsee T.: *See*—
Keville, Kathleen M.; Le, Quang N.; Mo, Wang-Tsee T.; and Rubin, Mae K., 4,986,894, Cl. 208-27.000.
Moalli, Angelo: *See*—
Calderazzo, Fausto; Pampaloni, Guido; Masi, Francesco; Moalli, Angelo; and Invernizzi, Renzo, 4,987,111, Cl. 502-113.000.
Mobay Corporation: *See*—
Williams, Gregory D., 4,986,929, Cl. 252-182.220.
Mobil Oil Corporation: *See*—
Alameddine, Bassem R., 4,986,352, Cl. 166-263.000.
Avidan, Amos A.; and Chin, Arthur A., 4,986,896, Cl. 208-52.0CT.
Chin, Arthur A., 4,986,897, Cl. 208-113.000.
Keville, Kathleen M.; Le, Quang N.; Mo, Wang-Tsee T.; and Rubin, Mae K., 4,986,894, Cl. 208-27.000.
Mochimaru, Hideaki; Komada, Kenya; Tomita, Masahiro; and Kasahara, Rikio, to Ricoh Company, Ltd. Process unit cartridge for an electrophotographic apparatus. 4,987,446, Cl. 355-200.000.
Mochizuki, Manabu; Kurotori, Tsuneo; Tsuruoka, Ichiro; Echigo, Katsuhiro; Takenouchi, Hiroaki; and Soga, Setsuo, to Ricoh Company, Ltd. Fixing method for a wet process copier. 4,987,457, Cl. 355-285.000.
Mogilevsky, Ilya M.; Vengerov, Igor A.; Gusar, Alexandr G.; Makarov, onstantin A.; and Chebyshev, Alexei E. Coordinate grid for a stereoscopic measuring device. 4,986,652, Cl. 356-2.000.
Mohr, Dieter: *See*—
Rode, Klaus; Mohr, Dieter; Frass, Werner; and Gersdorf, Joachim, 4,987,055, Cl. 430-277.000.
Mohr, Klaus-Peter: *See*—
Schmidhammer, Ludwig; Hirschmann, Peter; Mohr, Klaus-Peter; Klaus, Hermann; and Haunberger, Franz, 4,986,975, Cl. 423-488.000.
Moise, Norton L.: *See*—
Webster, Jackie R.; Pearson, Keith V.; Chang, David B.; Moise, Norton L.; and Vali, Victor, 4,987,582, Cl. 378-85.000.

Molex Incorporated: *See*—
Leonard, Russell J.; Miskin, Michael J.; and Schroll, Ross E., 4,986,766, Cl. 439-352.000.
Molins PLC: *See*—
Cahill, Michael J.; Dawson, John; and Warner, Brian H., 4,986,284, Cl. 131-88.000.
Carter, David C. M.; Dunckley, Ian; and Lait, Leonard G., 4,986,408, Cl. 198-368.000.
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Schneider, Werner; Borowski, Horst; Kausch, Erwin; Kutting, Rolf; Meyer, Meinhard; Moller, Knut; Muller, Bernd-Henrik; and Schluter, Adolf, 4,986,287, Cl. 131-360.000.
Monette, Jean-Yves; and Desabrais, Sylvain, to Pulsecom Division of Hubbell Incorporated. Telephone system digital channel bank interface. 4,987,573, Cl. 370-111.000.
Monroe, Bruce M., to Du Pont de Nemours, E. I., and Company. Photopolymerization sensitizers active at longer wavelengths. 4,987,230, Cl. 546-94.000.
Monsanto Company: *See*—
Day, Richard J.; Harlow, Harry B.; and Owsley, Dennis C., 4,987,266, Cl. 568-584.000.
Udipi, Kishore; and Padwa, Allen R., 4,987,187, Cl. 525-173.000.
Monsanto Kasei Company: *See*—
Aoki, Yuji; and Watanabe, Makoto, 4,987,185, Cl. 525-66.000.
Montemayor Uzeta, Luis A. Fuel purifying apparatus. 4,986,907, Cl. 210-179.000.
Montgomery, Jerry A.; and Parkhurst, Larry S., to Southwest Canopy Company. Service station improvements. 4,986,446, Cl. 222-94.000.
Moon, Bum K., to Goldstar Co., Ltd. Abrasion-proof tester. 4,986,109, Cl. 73-7.000.
Moore, David G.: *See*—
Lina, Jean-Pierre; Pennaneach, Herve ; Ostrowsky, Efrem M.; and Moore, David G., 4,986,453, Cl. 222-321.000.
Moore, Martin E.; and Bennett, Robert R., to United States of America, Navy. Self-sealing separation fastener for small confines. 4,986,708, Cl. 411-20.000.
Moore, Wayne A.; Nozaki, Tom, Jr.; Parks, David R.; Stovel, Richard T.; and Breitbard, Gary, to Stanford University. Apparatus and method for multidimensional characterization of objects in real time. 4,987,539, Cl. 364-413.080.
Morgan, A. Charles, Jr.; and Anderson, David C., to NeoRx Corporation. Imaging tissue sites of inflammation. 4,986,979, Cl. 424-1.100.
Mori, Eiji; Sonoda, Hidefumi; Hiraku, Akira; Minezawa, Morio; Kato, Isao; and Ito, Koichi, to Toyota Jidosha Kabushiki Kaisha. Charcoal canister for use in a fuel purge system of an internal combustion engine. 4,986,840, Cl. 55-316.000.
Mori, Kikuichi: *See*—
Kajiwara, Kenichi; Mori, Kikuichi; and Ikeda, Hideo, 4,986,736, Cl. 416-181.000.
Mori, Shigeru: *See*—
Kuwata, Satoshi; Sakuta, Koji; and Mori, Shigeru, 4,987,169, Cl. 524-267.000.
Mori, Tetsuro: *See*—
Yamanouchi, Masahide; and Mori, Tetsuro, 4,987,384, Cl. 330-286.000.
Mori, Yoshiaki: *See*—
Takagi, Hiroshi; Mori, Yoshiaki; Tani, Hiroji; and Sakabe, Yukio, 4,987,108, Cl. 501-138.000.
Moriarty, Kevin J., to Deere & Company. Belted crawler having auxiliary drive. 4,986,377, Cl. 180-6.500.
Moriguchi, Sanseki: *See*—
Fukuyama, Tatsuo; Okada, Toshihiko; Moriguchi, Sanseki; Kamiya, Yoshio; and Ogata, Eisuke, 4,987,113, Cl. 502-338.000.
Morimoto, Yoshihiko, to Fuji Jukogyo Kabushiki Kaisha. Control system for a clutch of a motor vehicle. 4,986,396, Cl. 192-0.052.
Morin, Alain: *See*—
Bonnebat, Claude; Quentin, Jean-Pierre; and Morin, Alain, 4,987,020, Cl. 428-64.000.
Morishita, Akira; and Isozumi, Shuzoo, to Mitsubishi Denki Kabushiki Kaisha. Dray torque relationship of a undirectional clutch in an engine stater motor. 4,986,140, Cl. 74-7.00C.
Morishita, Mitsuharu, to Mitsubishi Denki Kabushiki Kaisha. Motorized power steering apparatus. 4,986,379, Cl. 180-79.100.
Morishita, Mitsuharu, to Mitsubishi Denki Kabushiki Kaisha. Motorized power steering apparatus. 4,986,380, Cl. 180-79.100.
Morishita, Mitsuharu; and Yasukawa, Takeshi, to Mitsubishi Denki Kabushiki Kaisha. Unitized electric power steering apparatus. 4,986,381, Cl. 180-79.100.
Morita, Hiroshi: *See*—
Kobayashi, Kiyoteru; Nishimura, Tadashi; Morita, Hiroshi; Nakao, Shuji; Oda, Hidekazu; and Inoue, Yasuo, 4,987,092, Cl. 437-57.000.
Morita, Noriko: *See*—
Zumoto, Nobuyuki; Takahama, Toru; Hoshinouchi, Susumu; and Morita, Noriko, 4,986,214, Cl. 118-722.000.
Moriwaki, Masahiro: *See*—
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Moriya, Takashi; Ueda, Masahiko; and Endo, Toshihiro, to Citizen Watch Co., Ltd. Print head for dot matrix printers. 4,986,179, Cl. 101-93.040.
Moriyama, Keiji, to Nikon Corporation. Lens system capable of close-up photographing. 4,986,643, Cl. 350-477.000.
Morningstar, Leroy J.: *See*—
Adams, Charles N., III; and Morningstar, Leroy J., 4,986,769, Cl. 439-681.000.
Morohashi, Kazuo; Kawasaki, Masayoshi; Tsukabayashi, Kazuo; and Hamade, Saburo, to Ishikawa Prefecture; and Nippon Oil Company, Ltd. Package feed for a prescribed weft length of carbon fiber. 4,986,316, Cl. 139-452.000.
Morris, Philip W. Attachment for mechanic's creeper. 4,986,558, Cl. 280-32.600.
Morris, Terry L.: *See*—
Marentic, Francis J.; and Morris, Terry L., 4,986,496, Cl. 244-130.000.
Morrison, Elbert F., to Burlington Industries, Inc. Vacuum spinning nozzle assembly. 4,986,066, Cl. 57-333.000.
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Poturaev, Valentin N.; Chervonenko, Alfred G.; Morus, Vladimir L.; and Lavrukhin, Viktor A., 4,986,422, Cl. 209-326.000.
Moruta, Masaya: *See*—
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Bushell, Michael J.; Carr, Robin A. E.; Moseley, Donn W.; and Sillars, Nan C., 4,987,141, Cl. 514-346.000.
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Hahnewald, Andrea; Mothrath, Georg; Schamberg, Stefan; and Ullrich, Volker, 4,986,173, Cl. 99-338.000.
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Kazuyuki, Wakasugi; Kikkawa, Katsumasa; Yamaguchi, Masahiko; and Motohashi, Katsuichi, 4,987,262, Cl. 564-443.000.
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Fujimura, Shuzo; Mihara, Satoru; Kisa, Toshimasa; and Motoki, Yasunari, 4,987,284, Cl. 219-121.430.
Motorola, Inc.: *See*—
Clark, Edward T.; and Ferrer, Enrique, 4,987,392, Cl. 333-103.000.
Fernandez, Virgilio A.; and Gerosa, Gianfranco, 4,987,327, Cl. 307-491.000.
Goronkin, Herbert; and Tehrani, Saied N., 4,987,463, Cl. 357-022.000.
Haymond, William D.; Sillett, Roderick J.; and Lukas, Robert M., 4,987,571, Cl. 370-85.000.
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Mounet, Jean-Charles, to Framatome. Sealing plug for a steam-generator tube. 4,986,313, Cl. 138-89.000.
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Nedelec, Lucien; Nique, Francois; and Moura, Anne-Marie, 4,987,128, Cl. 514-175.000.
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Mraz, Dennis, to DM Enterprises, Inc. Conveyor belt inversion device. 4,986,413, Cl. 198-839.000.
MTU Motoren und Turbinen- Union Munchen GmbH: *See*—
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Mueller, Laverne J. Nutrition and exercise education game and method of play thereof. 4,986,757, Cl. 434-127.000.
Mueller, Mark D.; Jones, Frank; Quintana, Julio; Ruddy, Kenneth E.; and Mims, Michael, to Union Oil Company of California. Well casing flotation device and method. 4,986,361, Cl. 166-381.000.
Mukae, Nobuto: *See*—
Kinugasa, Hisashi; and Mukae, Nobuto, 4,987,103, Cl. 501-89.000.
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Muller, Bernd-Henrik: *See*—
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Mullins, Bill W.: *See—*
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Mulshine, James P., to Inresco, Inc. Solid state circuit protector. 4,987,512, Cl. 361-57.000.
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Muramoto, Yutaka: *See—*
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Muraoka, Yutaka, to Fanuc Ltd. System for calculation of sum of products by repetitive input of data. 4,987,557, Cl. 364-750.500.
Murasaki, Hiroshi: *See—*
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Murata, Fumiya: *See—*
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Murata, Ikuo: *See—*
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Murata Manufacturing Co., Ltd.: *See—*
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Yamamoto, Hiroshi; and Terashima, Takeshi, 4,987,335, Cl. 313-103.00R.
Yorita, Tadahiro; and Matsumoto, Haruo, 4,987,393, Cl. 333-202.000.
Murata, Masayuk; Katsuta, Shinichiro; and Unno, Tomoyuki, to Kohjin Co., Ltd. High-grade thermal recording sheet and a method of making the same. 4,987,118, Cl. 503-200.000.
Murayama, Tetsuo: *See—*
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Murnane, James F., II: *See—*
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Murphy, James V., to Advanced Interconnections Corporation. Method and apparatus for removing a multi-pin component installed in sockets on a circuit board. 4,985,989, Cl. 29-829.000.
Murphy, John W.; Haitz, Albert G.; and Myers, Kenneth L., to General Motors Corporation. Rotor lamination assembly for a dynamoelectric machine. 4,987,330, Cl. 310-217.000.
Murray, Aengus: *See—*
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Musser, Kevin E.: *See—*
White, Craig W.; and Musser, Kevin E., 4,987,316, Cl. 307-10.100.
Muszynski, Richard S. Motorcycle stand. 4,986,557, Cl. 280-298.000.
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Myers, Kent R.; and Ribi, Edgar F., deceased (by Ribi, Karin S., personal representative), to Ribi ImmunoChem Research, Inc. Derivatives of monophosphoryl lipid A. 4,987,237, Cl. 549-222.000.
Nabisco Brands, Inc.: *See—*
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Nagano, Yoshinobu: *See—*
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Yamazaki, Shunpei; Suzuki, Kunio; Nagayama, Susumu; Inujima, Takashi; Abe, Masayoshi; Fukada, Takeshi; Kinka, Mikio; Kobayashi, Ippei; Shibata, Katsuhiko; Susukida, Masato; and Koyanagi, Kaoru, 4,986,213, Cl. 118-719.000.
Nahmiaj, Jean, to Cereberus Guinard. Fire fighting process and use of the method. 4,986,363, Cl. 169-46.000.
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Naito, Takeyuki; Kuroda, Yoshiki; and Yoshida, Hiroshi, to Ebara Corporation. Method of controlling combustion in fluidized bed incinerator. 4,986,198, Cl. 110-346.000.
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Nakagawa, Shuichi; Murasaki, Hiroshi; Ikegawa, Akihito; Etou, Kouichi; and Mizuno, Hiroshi, to Minolta Camera Kabushiki Kaisha. Developing apparatus provided with a chamber for controlling toner grain diameter. 4,987,452, Cl. 355-245.000.
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Nakajima, Nobuyuki; Moruta, Masaya; Yamaguchi, Toshio; and Eitai, Kazuo, to Diesel Kiki Co., Ltd. Vane compressor with ball valve located at the end of vane biasing conduit. 4,986,741, Cl. 418-268.000.
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Nakamura, Akihide, to Nissan Motor Co., Ltd. Ignition apparatus mounting structure for internal combustion engine. 4,986,249, Cl. 123-635.000.
Nakamura, Fumiko. Automatic video editing system and method. 4,987,552, Cl. 364-521.000.
Nakamura, Katsuyuki; Yamazaki, Satoru; Kato, Jinichiro; and Tokushige, Kensaku, to Director - General of Agency of Industrial Science and Technology. Diacetylene compound having double bond and shaped article thereof. 4,987,257, Cl. 564-153.000.
Nakamura, Kiichi; Itakura, Masami; Atsumi, Yasuhiko; Watanabe, Hideo; and Kanagawa, Youiti, to TDK Corporation. Producing method of thick film complex component. 4,987,009, Cl. 427-96.000.
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Nakamura, Mamoru; and Hori, Hideya, to Aisin Seiki Kabushiki Kaisha. Electric coil assembly. 4,987,399, Cl. 336-192.000.
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Nakamura, Nobuaki, to Victor Company of Japan, Ltd. Reflective optical encoder device with light beams applied as spats spaced by 2 predetermined pitch. 4,987,301, Cl. 250-231.160.
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Nakano, Hideharu: *See*—
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Nakano, Kazuhiko; Matsuda, Norio; Murase, Mitsutoshi; and Murakami, Hideaki, to Sumitomo Chemical Company, Limited. Furnace structure for ceramic powder production. 4,986,967, Cl. 422-188.000.

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Nanri, Seiji, to Dainippon Screen Mfg. Co., Ltd. Method and apparatus for preventing light source degradation in an exposing apparatus employing a halogen lamp. 4,987,444, Cl. 355-69.000.

Narumi, Kazuhito; Takeuchi, Fumio; and Sakaguchi, Michiaki, to Nippon Oil & Fats Co., Ltd. Ceramic composition for reduction-reoxidation type semiconductive capacitor. 4,987,107, Cl. 501-137.000.

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Naruse, Nobutaka; Hirano, Akihiko; and Minari, Katsunobu, to Hoshizaki Denki Kabushiki Kaisha. Freezer machine. 4,986,083, Cl. 62-157.000.

Narushima, Hiroshi; and Kawai, Sumio, to Okuma Mahinery Works Ltd. Tool mounting apparatus. 4,986,704, Cl. 409-233.000.

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Cooper, Gerald C., 4,986,147, Cl. 81-63.200.

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O'Neill, William J., 4,986,279, Cl. 128-754.000.
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Natsuhara, Toshiya; Enoguchi, Yuji; Mizuno, Hiroshi; Anno, Masahiro; and Machida, Junji, to Minolta Camera Kabushiki Kaisha. Developing method for developing electrostatic latent image. 4,987,454, Cl. 355-259.000.

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Nedelec, Lucien; Nique, Francois; and Moura, Anne-Marie, to Roussel Uclaf. Novel 10β-alkynyl-steroids. 4,987,128, Cl. 514-175.000.

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Neenan, Thomas X.; and Whitesides, George M., to President and Fellows of Harvard, The. Diethynyl monomers and polymers thereof. 4,987,209, Cl. 526-243.000.

Neff, John P.: *See*—
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Nelgo Manufacturing, Inc.: *See*—
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Eriksson, Larry J., 4,987,598, Cl. 381-71.000.

Nelson Irrigation Corporation: *See*—
Schisler, Richard L.; and Sesser, George L., 4,986,474, Cl. 239-205.000.

Nelson, Kenneth L., to Scotsman Group, Inc. Evaporator device for ice-making apparatus. 4,986,088, Cl. 62-347.000.

Nelson, Thomas E. Truss setting system. 4,986,052, Cl. 52-745.000.

Nemirovsky, Robert, to Nemirovsky, Robert; and Deutsch, Joseph. XY positioning apparatus. 4,986,797, Cl. 474-101.000.

Nemoto, Takeo: *See*—
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Nentwig, Jurgen; Scheller, Frieder; Hanke, Gunter; Breitmoser, Wolfgang; Weise, Hartmut; Pfeiffer, Dorothea; Nunchert, Anette; Schubert, Florian; Meiske, Christoph; and Kuhnel, Siegfried, to Akademie der Wissenschaften. Method of making an enzyme membrane for enzyme electrodes. 4,987,075, Cl. 435-182.000.

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Nestle S.A.: *See*—
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Neturen Company Limited: *See*—
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Schertenleib, Peter, 4,986,293, Cl. 134-168.00R.

Neumann, Peter: *See*—
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Neuwirth, Ernst; Rabe, Jurgen; and Ritter, Joachim, to INA Walzlager Schaeffler KG. Cage for overrunning clutch. 4,986,402, Cl. 192-45.000.

New England Biolabs, Inc.: *See*—
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New York State Energy Research and Development Authority: *See*—
Hickey, Robert F., 4,986,916, Cl. 210-603.000.

Newcomb Spring Corp.: *See*—
Jacobson, D. John, 4,986,103, Cl. 72-137.000.

Ng, Yong K.: *See*—
Prakash, Chacko; Ng, Yong K.; and Teo, Pek B., 4,987,388, Cl. 331-158.000.

NGK Insulators, Ltd.: *See*—
Kato, Nobuhide; and Katsu, Masanori, 4,986,892, Cl. 204-427.000.

Nguyen, Bich-Yen; Lee, Jen-Jiang; Nguyen, Hoang K.; Limb, Young; and Tobin, Philip J., to Motorola, Inc. Process for forming high purity thin films. 4,987,102, Cl. 437-238.000.

Nguyen, Hoang K.: *See*—
Nguyen, Bich-Yen; Lee, Jen-Jiang; Nguyen, Hoang K.; Limb, Young; and Tobin, Philip J., 4,987,102, Cl. 437-238.000.

Nguyen, My N.; Wood, Julie H.; and Herrington, Thomas L., to Johnson Matthey Inc. Silver-glass pastes. 4,986,849, Cl. 106-1.140.

Nichigan Co. Ltd.: *See*—
Yamaguchi, Naoki, 4,986,756, Cl. 434-96.000.

Nichols, James D.; and Dickenson, John B., to Air Products and Chemicals, Inc. Organotin catalysts for use in polyurethane systems. 4,987,244, Cl. 556-89.000.

Nicora, Carlo: *See*—
Li Bassi, Giuseppe; Nicora, Carlo; Broggi, Fabrizio; and Revelli, Aldo, 4,987,159, Cl. 522-36.000.

Niemann, David: *See*—
Bizjak, John; Hassel, Michael; and Niemann, David, 4,987,500, Cl. 360-46.000.

Niemi, Ingemar; and Andersson, Lars-Erik, to Gruvprodukter I Gallivare AB. Apparatus for driving an upwardly directed shaft in rock. 4,986,374, Cl. 175-86.000.

Nihon Bussan Kabushiki Kaisha: *See*—
Takasaki, Takashi; Yanai, Reikichi; Amakawa, Shigeru; Takizawa, Yoichi; and Iwamoto, Akira, 4,986,999, Cl. 426-656.000.

Nihon Kaiheiki Industrial Company, Ltd.: *See*—
Hirose, Kenichi; and Ichikawa, Tadao, 4,987,279, Cl. 200-314.000.

Nii, Shinsuke: *See*—
Miyano, Takayuki; and Nii, Shinsuke, 4,987,522, Cl. 362-74.000.

Niigata, Kunihiro: *See*—
Imai, Kazuo; Niigata, Kunihiro; Fujikura, Takashi; and Hashimoto, Shinichi, 4,987,152, Cl. 514-603.000.

Niimura, Satoru: *See*—
Yokokura, Takashi; Hori, Nobuo; Shimozono, Hiroaki; and Niimura, Satoru, 4,986,653, Cl. 356-5.000.

Nikka Kabushiki Kaisha: *See*—
Sawaguchi, Ikuo; and Omi, Kiyonobu, 4,986,182, Cl. 101-483.000.

Niklaus, Bruno, to Swatch A.G. Presentation stand intended for watches. 4,986,426, Cl. 211-13.000.

Nikon Corporation: *See*—
Moriyama, Keiji, 4,986,643, Cl. 350-477.000.

Nilsson, Bengt: *See*—
Gullichsen, Johan; Nilsson, Bengt; and Hoglund, Ronny, 4,986,480, Cl. 241-28.000.
Nippon A B S, Ltd.: *See*—
Arikawa, Teturo, 4,986,612, Cl. 303-110.000.
Nippon Gohsei Kagaku Kogyo Kabushiki Kaisha: *See*—
Akiyama, Mamoru; Matsuyama, Takeshi; Yanagida, Yoshiyuki; and Yamashita, Akira, 4,987,186, Cl. 525-107.000.
Nippon Kayaku Kabushiki Kaisha: *See*—
Nowatari, Hiroyoshi; Hayami, Hiroshi; Kuroda, Yasuo; Yoda, Sumio; and Takahashi, Katsutoshi, 4,987,246, Cl. 556-137.000.
Nippon Kokan Kabushiki Kaisha: *See*—
Masuda, Sadakazu; Fujita, Fumio; Kamata, Masamoto; Yoshini, Masahiko; Ariizumi, Takashi; Okami, Yuji; Takada, Yoshikazu; and Inagaki, Junichi, 4,986,341, Cl. 164-477.000.
Uyama, Kiyoshi; and Kihara, Yasuhiko, 4,986,910, Cl. 210-251.000.
Nippon Kokan Kaubshiki Kaisha: *See*—
Fukuyama, Tatsuo; Okada, Toshihiko; Moriguchi, Sanseki; Kamiya, Yoshio; and Ogata, Eisuke, 4,987,113, Cl. 502-338.000.
Nippon Oil Company, Ltd.: *See*—
Morohashi, Kazuo; Kawasaki, Masayoshi; Tsukabayashi, Kazuo; and Hamade, Saburo, 4,986,316, Cl. 139-452.000.
Nippon Oil & Fats Co., Ltd.: *See*—
Narumi, Kazuhito; Takeuchi, Fumio; and Sakaguchi, Michiaki, 4,987,107, Cl. 501-137.000.
Orikasa, Yuichi; and Sakazume, Suehiro, 4,987,165, Cl. 523-435.000.
Nippon Petrochemicals Co., Ltd.: *See*—
Orikasa, Yuichi; and Sakazume, Suehiro, 4,987,165, Cl. 523-435.000.
Nippon Pharmaceutical Development Institute Co., Ltd.: *See*—
Shimizu, Shigeo; and Takano, Hiroyuki, 4,987,129, Cl. 514-206.000.
Nippon Pillar Packing Co., Ltd.: *See*—
Kinugasa, Hisashi; and Mukae, Nobuto, 4,987,103, Cl. 501-89.000.
Nippon Seiko Kabushiki Kaisha: *See*—
Osawa, Nobuyuki; and Mizumura, Yoshinori, 4,986,508, Cl. 248-300.000.
Nippon Sheet Glass Co., Ltd.: *See*—
Oyoshi, Keiji; Tagami, Takashi; and Tanaka, Shuhei, 4,986,841, Cl. 65-30.130.
Nippon Soken, Inc.: *See*—
Nishida, Minoru; Mizuno, Naohito; Hattori, Tadashi; Huzino, Seizi; and Ando, Yoshiyasu, 4,986,861, Cl. 156-89.000.
Nippon Steel Corporation: *See*—
Miyazawa, Kenichi, 4,986,339, Cl. 164-466.000.
Nippon Telegraph and Telephone Corporation: *See*—
Ichinose, Susumu; Tetsutani, Nobuji; and Ishibashi, Morito, 4,987,487, Cl. 358-92.000.
Itoh, Kenichiro; Yamada, Takeshi; Onodera, Tsutomu; Yoshinuma, Mikio; and Kato, Yasuyuki, 4,986,843, Cl. 65-152.000.
Nippon Thompson Co., Ltd.: *See*—
Geka, Toshiaki, 4,986,725, Cl. 414-751.000.
Nippon Yakin Kogyo Co., Ltd.: *See*—
Koshiba, Yoshikazu; Ikegami, Yuji; Tachino, Noboru; and Kamiya, Takeshi, 4,987,000, Cl. 427-11.000.
Nippondenso Co., Ltd.: *See*—
Goshima, Takahiro; Yogo, Kazutoshi; Wakata, Hideo; and Kishimoto, Masashi, 4,986,611, Cl. 303-100.000.
Kushibe, Takahiro; Takano, Yuichi; Tateno, Manabu; Ohno, Eishi; and Shirabe, Naotaka, 4,986,247, Cl. 123-533.000.
Nique, Francois: *See*—
Nedelec, Lucien; Nique, Francois; and Moura, Anne-Marie, 4,987,128, Cl. 514-175.000.
Nishi, Tadaaki: *See*—
Sato, Hozumi; Shimada, Humito; Sakaguchi, Akio; Takemura, Yasuhiko; Nishi, Tadaaki; Ono, Hisao; Nagano, Masanobu; and Miyachi, Takumi, 4,987,017, Cl. 428-36.800.
Nishida, Hiroyasu: *See*—
Sato, Goro; Komatsu, Michio; Nishida, Hiroyasu; Tanaka, Yoshichika; Koyanagi, Tsuguo; and Mihara, Kei-ichi, 4,987,012, Cl. 427-221.000.
Nishida, Makoto: *See*—
Gohbara, Masatoshi; Asano, Tamotsu; Ozawa, Shuji; Yamazaki, Hideo; Ishii, Tsutomu; Nishida, Makoto; Watanabe, Junko; and Sato, Naoki, 4,986,846, Cl. 71-92.000.
Nishida, Minoru; Mizuno, Naohito; Hattori, Tadashi; Huzino, Seizi; and Ando, Yoshiyasu, to Nippon Soken, Inc. Semiconductor pressure sensor and method for bonding semiconductor chip to metal diaphragm thereof. 4,986,861, Cl. 156-89.000.
Nishihata, Toshihiko: *See*—
Iwabuchi, Yoshitaka; Wada, Yoshiyo; and Nishihata, Toshihiko, 4,987,505, Cl. 360-103.000.
Nishii, Michiharu; Mizuno, Genji; Nomura, Yoshihisa; Kato, Masahiko; Shirai, Kenji; and Tanoue, Junichi, to Aisin Seiki Kabushiki Kaisha; and Toyota Jidosha Kabushiki Kaisha. Hydraulic braking system for an automotive vehicle. 4,986,613, Cl. 303-114.000.
Nishikado, Takashi; Kondo, Megumu; and Murata, Fumiya, to Hitachi, Ltd. File system management method and file management system. 4,987,531, Cl. 364-200.000.
Nishikawa, Yukie: *See*—
Nitta, Koichi; Nishikawa, Yukie; Ishikawa, Masayuki; Tsuburai, Yasuhiko; and Kokubun, Yoshihiro, 4,987,097, Cl. 437-129.000.
Nishimura, Asao: *See*—
Yasuhara, Toshihiro; Masuda, Masachika; Nishimura, Asao; Hatada, Naozumi; Kawai, Sueo; Kitano, Makoto; Miura, Hideo; Yaguchi, Akihiro; and Murakami, Gen, 4,987,474, Cl. 357-70.000.
Nishimura, Seiya: *See*—
Iijima, Kenzaburou; Hayashi, Yoshinori; and Nishimura, Seiya, 4,987,040, Cl. 428-694.000.
Nishimura, Tadashi: *See*—
Kobayashi, Kiyoteru; Nishimura, Tadashi; Morita, Hiroshi; Nakao, Shuji; Oda, Hidekazu; and Inoue, Yasuo, 4,987,092, Cl. 437-57.000.
Nishino, Yutaro; and Kondoh, Kihachi, to Suzuki Jidosha Kogyo Kabushiki Kaisha. Suspending apparatus for vehicles. 4,986,566, Cl. 280-688.000.
Nishio, Naoki: *See*—
Hurley, Terry R.; and Nishio, Naoki, 4,987,489, Cl. 358-105.000.
Nishiura, Masaharu; and Sakurai, Kenya, to Fuji Electric Co., Ltd. Method of producing a metal-oxide semiconductor device. 4,987,098, Cl. 437-142.000.
Nisimura, Satoyuki: *See*—
Torihata, Takashi; and Nisimura, Satoyuki, 4,986,898, Cl. 208-251.00R.
Niskanen, Eero: *See*—
Baertschi, Alex J.; and Niskanen, Eero, 4,987,121, Cl. 514-8.000.
Nissan Chemical Industries Ltd.: *See*—
Oya, Eiichi; Watanabe, Junichi; Kondo, Yasuo; Kakuta, Takuya; Suzuki, Koichi; Nawamaki, Tsutomu; and Watanabe, Shigeomi, 4,986,845, Cl. 71-92.000.
Sato, Fumie, 4,987,236, Cl. 549-208.000.
Nissan Motor Co., Ltd.: *See*—
Hanai, Toshimichi; Nagashima, Hideyuki; and Fujita, Yasuyuki, 4,986,603, Cl. 297-468.000.
Inoue, Ryuzaburo; and Oota, Tadaki, 4,986,241, Cl. 123-479.000.
Ishii, Akira; Terui, Takashi; Hiraoka, Toyoki; and Murakami, Yuichi, 4,986,235, Cl. 123-195.00C.
Matsuda, Toshiro, 4,986,388, Cl. 180-248.000.
Nakamura, Akihide, 4,986,249, Cl. 123-635.000.
Uemura, Masakazu; Hirano, Yoshinori; and Shimonosono, Hitoshi, 4,986,345, Cl. 165-86.000.
Nissin Chemical Co.,Ltd.: *See*—
Ohata, Hiroyuki; Tanaka, Masaki; Ohashi, Hiroshi; Suemoto, Kiyoji; Iida, Hidekazu; and Saga, Hiroshi, 4,987,180, Cl. 524-860.000.
Nitsch, Wilhelm: *See*—
Benker, Gerhard; Nitsch, Wilhelm; Payrhammer, Bernd; Weinert, Volker; Treiber, Helmut; and Kluter, Ulrich, 4,987,440, Cl. 355-41.000.
Nitschke, Heinz; and Hauschild, Werner, to Rieter Machine Works, Ltd. Apparatus for cleaning a card. 4,985,966, Cl. 19-107.000.
Nitta, Koichi; Nishikawa, Yukie; Ishikawa, Masayuki; Tsuburai, Yasuhiko; and Kokubun, Yoshihiro, to Kabushiki Kaisha Toshiba. Method of manufacturing a semiconductor laser device. 4,987,097, Cl. 437-129.000.
Nitzberg, Leonard R.; and Manhardt, Paul D. Fuel dispensing nozzle having a flow rate limiter. 4,986,321, Cl. 141-206.000.
Nocacart S.p.A.: *See*—
Anghileri, Gianmario, 4,986,432, Cl. 220-23.400.
Nogarotto, Renzo: *See*—
Grandi, Guido; Mele, Antonio; Colletti, Elisabetta; Campagnoli, Susanna; and Nogarotto, Renzo, 4,987,078, Cl. 435-231.000.
Noguchi, Naoto; and Shinohara, Isao, to Matsushita Electric Industrial Co., Ltd. Electric motor with inner drive pulley. 4,987,333, Cl. 310-268.000.
Noguchi, Robert Y.: *See*—
Leaper, Mark W. E.; Noguchi, Robert Y.; and Sandusky, Randall L., 4,987,355, Cl. 318-561.000.
Noguchi, Takayuki, to NEC Corporation. Electronic computer system with means for issuing a non-store request before executing state transition prosecution. 4,987,532, Cl. 364-200.000.
Nohren, John, Jr.; and Nohren, Joseph H., to Innova Pure Water Inc. Bottled water cap with indicator and adaptor. 4,986,901, Cl. 210-85.000.
Nohren, Joseph H.: *See*—
Nohren, John, Jr.; and Nohren, Joseph H., 4,986,901, Cl. 210-85.000.
NOK Corporation: *See*—
Anzue, Kaoru; Isomoto, Jun; and Takei, Nobuo, 4,986,552, Cl. 277-38.000.
Nomura, Akihiro: *See*—
Fukase, Hisahiko; Matsui, Kunio; Nomura, Akihiro; and Hirata, Atsushi, 4,986,336, Cl. 164-415.000.
Nomura, Manabu; Tomomatsu, Ryuzo; and Kihara, Kazuaki, to Idemitsu Petrochemical Co., Ltd. Polyolefin resin composition containing fibrous inorganic filler. 4,987,173, Cl. 524-423.000.
Nomura, Ryouichi: *See*—
Hayashida, Haruo; Kubo, Kouji; Nomura, Ryouichi; and Koyama, Satoru, 4,987,191, Cl. 525-227.000.
Nomura, Yoshihisa: *See*—
Nishii, Michiharu; Mizuno, Genji; Nomura, Yoshihisa; Kato, Masahiko; Shirai, Kenji; and Tanoue, Junichi, 4,986,613, Cl. 303-114.000.
Nonomura, Tomohiro: *See*—
Watarai, Shinichi; Houki, Yoji; and Nonomura, Tomohiro, 4,986,528, Cl. 271-265.000.
Nopper, Leroy N.: *See*—
Miller, Meryl E.; Nopper, Leroy N.; and Lewis, David D., 4,987,275, Cl. 200-5.00A.
Nordson Corporation: *See*—
Hollstein, Thomas E.; Keefer, Larry W.; Fulkerson, Terrence M.; and Gray, Kenneth W., 4,986,210, Cl. 118-629.000.

Knobbe, Alan J.; Pintelon, Joseph A. E.; and Pinault, Daniel, 4,987,001, Cl. 427-28.000.
Noren, Lawrence J., III: *See*—
Dye, Clifford L.; Greenwood, Leon D.; Traxler, Mark T.; and Noren, Lawrence J., III, 4,986,675, Cl. 384-192.000.
Norling, Lars-Erik. Method and device for separating skeleton parts from a carcass. 4,985,963, Cl. 452-187.000.
Norsk Hydro A.S.: *See*—
Clausen, Edvin L., 4,986,597, Cl. 296-205.000.
Haraldsen, Hans F. T., 4,986,970, Cl. 423-321.00R.
North American Philips Corp.: *See*—
Flanner, Janet, 4,987,099, Cl. 437-192.000.
Wong, Stephen L., 4,987,348, Cl. 315-307.000.
Northern States Power Company: *See*—
Lehto, John M., 4,986,966, Cl. 422-168.000.
Northern Telecom Limited: *See*—
Wu, Kuang-Tsan; and McNicol, John D., 4,987,375, Cl. 329-309.000.
Northrop Corporation: *See*—
Jungwirth, Douglas R., 4,987,334, Cl. 310-333.000.
Norton Company: *See*—
Miller, Bradley J.; and Patten, Donald O., Jr., 4,987,035, Cl. 428-599.000.
Nose, Tetsuya, to Alpine Electronics Inc. Radio receiver incorporating automatic means for setting broadcast standard. 4,987,605, Cl. 455-161.000.
Noto, Nobuhiko: *See*—
Endo, Masahisa; Noto, Nobuhiko; and Takahashi, Toshiharu, 4,987,472, Cl. 357-60.000.
Nova-Werke AG: *See*—
Fuchs, Peter, 4,986,728, Cl. 417-443.000.
Nowatari, Hiroyoshi; Hayami, Hiroshi; Kuroda, Yasuo; Yoda, Sumio; and Takahashi, Katsutoshi, to Nippon Kayaku Kabushiki Kaisha. Novel platinum complexes. 4,987,246, Cl. 556-137.000.
Noworyta, Rudolf P.: *See*—
Oros, Alvin K.; Noworyta, Rudolf P.; and Sawyer, Fred G., 4,986,002, Cl. 33-354.000.
Nozaki, Masahiro: *See*—
Shigeki, Kiyoshi; and Nozaki, Masahiro, 4,986,947, Cl. 264-250.000.
Nozaki, Tom, Jr.: *See*—
Moore, Wayne A.; Nozaki, Tom, Jr.; Parks, David R.; Stovel, Richard T.; and Breitbard, Gary, 4,987,539, Cl. 364-413.080.
Nozoe, Shunpei: *See*—
Komeno, Minoru; Hirao, Motoaki; Takeuchi, Toshiyuki; Nozoe, Shunpei; Takano, Hideki; and Yoshida, Katsunori, 4,986,199, Cl. 110-347.000.
NTN Corporation: *See*—
Kawashima, Kazuki; and Hayakawa, Hisashi, 4,986,796, Cl. 474-101.000.
Numasaki, Yoso: *See*—
Ito, Noriki; Nagano, Yoshinobu; Tanaka, Akihiro; Numasaki, Yoso; and Takahashi, Koichiro, 4,987,147, Cl. 514-399.000.
Nunchert, Anette: *See*—
Nentwig, Jurgen; Scheller, Frieder; Hanke, Gunter; Breitmoser, Wolfgang; Weise, Hartmut; Pfeiffer, Dorothea; Nunchert, Anette; Schubert, Florian; Meiske, Christoph; and Kuhnel, Siegfried, 4,987,075, Cl. 435-182.000.
Nycomed AS: *See*—
Jacobsen, Trond, 4,986,980, Cl. 424-9.000.
Laerum, Ole D., 4,987,122, Cl. 514-15.000.
Nykerk, Michael, to Electronic Security Products of California. Alarm system for sensing and vocally warning of an unauthorized approach towards a protected object or zone. 4,987,402, Cl. 340-426.000.
O & K Orenstein & Koppel Aktiengesellschaft: *See*—
Lohmann, Karl, 4,986,593, Cl. 296-190.000.
Oakland Engineering, Inc.: *See*—
Fisch, Alfred C., 4,986,912, Cl. 210-448.000.
Oberster, Arthur E.; Roland, Charles M.; and Bohm, Georg G. A. Colored tire stocks having improved abrasion resistance, color and color and color stability. 4,987,192, Cl. 525-274.000.
O'Brien, Michael J., to Johnson Service Company. Signature analysis control system for a stamping press. 4,987,528, Cl. 364-184.000.
Ochiai, Isao: *See*—
Stormberg, Hans-Peter; Watanabe, Yoshio; and Ochiai, Isao, 4,987,345, Cl. 315-111.210.
O'Connell, Michael O. Method and apparatus for suppressing explosions and fires. 4,986,366, Cl. 169-66.000.
Oda, Hidekazu: *See*—
Kobayashi, Kiyoteru; Nishimura, Tadashi; Morita, Hiroshi; Nakao, Shuji; Oda, Hidekazu; and Inoue, Yasuo, 4,987,092, Cl. 437-57.000.
Oda, Tetsuya: *See*—
Tozune, Sigeru; Yamazaki, Shizuo; Komori, Ryuichi; Ishii, Masashi; Sakaguchi, Yoshio; and Oda, Tetsuya, 4,987,156, Cl. 521-99.000.
Ofori-Tenkorang, John; Otten, David; and Casey, Leo, to Lutron Electronics Co., Inc. Potentiometer state sensing circuit. 4,987,372, Cl. 324-705.000.
Ogata, Eisuke: *See*—
Fukuyama, Tatsuo; Okada, Toshihiko; Moriguchi, Sanseki; Kamiya, Yoshio; and Ogata, Eisuke, 4,987,113, Cl. 502-338.000.
Ogawa, Sumitaka: *See*—
Honda, Satoshi; Ogawa, Sumitaka; and Hayasi, Tatsuo, 4,987,544, Cl. 364-431.050.
Ogoda, Makoto, to Fuji Photo Film Co., Ltd. Method and mechanism for feeding and positioning a sheet. 4,986,527, Cl. 271-250.000.
Oguma, Tomio; and Kai, Masashi, to Aisin Seiki Kabushiki Kaisha. Cleaning device for contact lens. 4,986,290, Cl. 134-95.000.
Oguri, Yukio: *See*—
Sirosita, Masao; Mizutani, Masato; Kimura, Shigeko; Oguri, Yukio; Kitamura, Masaru; Umada, Youichi; and Sato, Hiroshi, 4,986,989, Cl. 424-635.000.
Ohara, Takeshi: *See*—
Uchiyama, Futoshi; Agatsuma, Ko; Ohara, Takeshi; Tsukamoto, Koichi; Ishigami, Sumiyuki; Sato, Mitsuru; and Sugimoto, Hisashi, 4,986,670, Cl. 374-117.000.
Ohashi, Hiroshi: *See*—
Ohata, Hiroyuki; Tanaka, Masaki; Ohashi, Hiroshi; Suemoto, Kiyoji; Iida, Hidekazu; and Saga, Hiroshi, 4,987,180, Cl. 524-860.000.
Ohata, Hiroyuki; Tanaka, Masaki; Ohashi, Hiroshi; Suemoto, Kiyoji; Iida, Hidekazu; and Saga, Hiroshi, to Shin-Etsu Chemical Co., Ltd.; and Nissin Chemical Co.,Ltd. Silicone-based fabric finishing agent. 4,987,180, Cl. 524-860.000.
Ohba, Mitsuru: *See*—
Kobayashi, Yukio; Sasaki, Hitoshi; Matsuo, Norishige; and Ohba, Mitsuru, 4,986,995, Cl. 426-412.000.
Ohba, Yozo; Yamanaka, Masaaki; Sudo, Moriyasu; and Iwai, Akira, to Oji Yuka Goseishi Co., Ltd. Process for producing synthetic label paper. 4,986,866, Cl. 156-220.000.
Ohe, Shinichi, to Canon Kabushiki Kaisha. Apparatus for analyzing particles using scattered and fluorescent light. 4,986,657, Cl. 356-73.000.
Ohio State University, The: *See*—
Wilde, Bryan E.; and Budinski, Michael K., 4,987,037, Cl. 428-653.000.
Ohischlager, Hans: *See*—
Berthold, Werner; Haseler, Helmut; Marx, Paul; Meckl, Heinz; and Ohischlager, Hans, 4,987,059, Cl. 430-428.000.
Ohishi, Nobuko: *See*—
Kurono, Masayasu; Yamakawa, Hidehumi; Koshizaka, Takuya; Suzuki, Takehiko; Kato, Eiichi; Iida, Takafumi; Ohishi, Nobuko; and Yagi, Kunio, 4,987,150, Cl. 514-455.000.
Ohkouchi, Isao: *See*—
Koseki, Yasuo; Yamada, Akira; Kurokawa, Hideaki; Ohkouchi, Isao; Ebara, Katsuya; and Takahashi, Sankichi, 4,986,079, Cl. 62-59.000.
Ohlenbusch, Cord W., to Proconics International, Inc. Wafer transfer apparatus. 4,986,729, Cl. 414-787.000.
Ohlendorf, Rolf; Treyz, Willy; and Speier, Wolfgang, to Daimler-Benz AG. Device for a relative angular adjustment between two shafts connected to one another by driving means. 4,986,801, Cl. 475-331.000.
Ohmine, Hiroyuki: *See*—
Sunahara, Yonehiko; Matsunaga, Makoto; Mano, Seiji; Ohmine, Hiroyuki; and Tsuchiya, Makio, 4,987,421, Cl. 343-700.0MS.
Ohmori, Toshiaki; and Fukumoto, Takaaki, to Mitsubishi Denki Kabushiki Kaisha. Semiconductor manufacturing apparatus. 4,986,216, Cl. 118-730.000.
Ohms, Franz, to ANT Nachrichtentechnik GmbH. Switching regulator having a constant current through its inductance. 4,987,361, Cl. 323-222.000.
Ohnemus, Fritz: *See*—
Hartmann, Uwe; and Ohnemus, Fritz, 4,987,350, Cl. 315-382.000.
Ohnishi, Kazuhiko; Miki, Shoji; Fujita, Yasuo; Tsubota, Hiroki; and Uosaki, Katsuji, to Glory Kogyo Kabushiki Kaisha. Recognition method for letter patterns. 4,987,603, Cl. 382-25.000.
Ohno, Eishi: *See*—
Kushibe, Takahiro; Takano, Yuichi; Tateno, Manabu; Ohno, Eishi; and Shirabe, Naotaka, 4,986,247, Cl. 123-533.000.
Ohono, Tooru: *See*—
Seo, Ikuo; Takahashi, Saburou; and Ohono, Tooru, 4,986,893, Cl. 208-39.000.
Ohta, Masahiro; Kawashima, Saburo; Iiyama, Katsuaki; Tamai, Shoji; Oikawa, Hideaki; and Yamaguchi, Akihiro, to Mitsui Toatsu Chemicals, Inc. Polyimide/polyamideimide resin composition. 4,987,197, Cl. 525-436.000.
Ohta, Masahiro: *See*—
Yamaya, Norimasa; Ohta, Masahiro; and Yamaguchi, Akihiro, 4,987,207, Cl. 528-170.000.
Ohta, Mitsuru, to Brother Kogyo Kabushiki Kaisha. Microlens and process for producing same. 4,986,633, Cl. 350-167.000.
Ohta, Mutsumi, to NEC Corporation. Decoding device capable of forwardly and backwardly reproducing pictures with a high quality. 4,987,490, Cl. 358-136.000.
Ohtake, Nobumasa: *See*—
Saho, Takahiro; Akutsu, Yoshinori; Nakano, Takaharu; and Ohtake, Nobumasa, 4,987,203, Cl. 528-27.000.
Ohto, Takashi; Tanaka, Takashi; and Sato, Makoto, to Toshiba Ceramics Co., Ltd. Component for producing semiconductor devices and process of producing it. 4,987,016, Cl. 428-34.100.
Ohtsuka, Eiji, to Kabushiki Kaisha Toshiba. Electronic telephone apparatus able to supply sync clock signals reliably, and method of controlling the supply of sync clock signals. 4,987,591, Cl. 379-279.000.
Oikawa, Hideaki: *See*—
Ohta, Masahiro; Kawashima, Saburo; Iiyama, Katsuaki; Tamai, Shoji; Oikawa, Hideaki; and Yamaguchi, Akihiro, 4,987,197, Cl. 525-436.000.
Oishi, Hiroshi, to Sanshin Kogyo Kabushiki Kaisha. Ignition timing controller for internal combustion engine. 4,986,239, Cl. 123-413.000.

Ojha, Purnendu S., to Eastman Kodak Company. Control sheet generation for copiers and printers. 4,987,447, Cl. 355-204.000.
Oji Yuka Goseishi Co., Ltd.: *See—*
Ohba, Yozo; Yamanaka, Masaaki; Sudo, Moriyasu; and Iwai, Akira, 4,986,866, Cl. 156-220.000.
Okada, Hideaki, to Kanzaki Kokyukoki Mfg. Co., Ltd. Axle driving apparatus. 4,986,073, Cl. 60-454.000.
Okada, Hiroshi: *See—*
Haga, Takahiro; Yamada, Nobutoshi; Sugi, Hideo; Koyanagi, Toru; and Okada, Hiroshi, 4,987,135, Cl. 514-274.000.
Okada, Kouichi: *See—*
Horikawa, Kazuo; Miyagawa, Ichirou; and Okada, Kouichi, 4,986,634, Cl. 350-174.000.
Okada, Takao: *See—*
Takase, Tsugiko; Adachi, Hideo; Okada, Takao; Shimazu, Hisanari; and Tomabechi, Hideo, 4,987,303, Cl. 250-306.000.
Okada, Toshihiko: *See—*
Fukuyama, Tatsuo; Okada, Toshihiko; Moriguchi, Sanseki; Kamiya, Yoshio; and Ogata, Eisuke, 4,987,113, Cl. 502-338.000.
Okami, Yuji: *See—*
Masuda, Sadakazu; Fujita, Fumio; Kamata, Masamoto; Yoshini, Masahiko; Ariizumi, Takashi; Okami, Yuji; Takada, Yoshikazu; and Inagaki, Junichi, 4,986,341, Cl. 164-477.000.
Okamoto, Hironobu; Izumi, Tetsujirou; Kishi, Hiroo; and Okamoto, Naoki, to Robotech Laboratory Co., Ltd. Remote control system of mobile objects. 4,986,384, Cl. 180-167.000.
Okamoto, Naoki: *See—*
Okamoto, Hironobu; Izumi, Tetsujirou; Kishi, Hiroo; and Okamoto, Naoki, 4,986,384, Cl. 180-167.000.
Okamoto, Yoshiyuki: *See—*
Akagi, Motonobu; and Okamoto, Yoshiyuki, 4,986,233, Cl. 123-634.000.
Okayama, Tomoaki, to Murata Kikai Kabushiki Kaisha. Yarn joining control device in an automatic winder. 4,986,482, Cl. 242-35.6OR.
Okayasu, Kenji. Heat conducting device. 4,986,348, Cl. 165-104.240.
Okazaki, Masaki: *See—*
Terai, Fumitaka; Yamagami, Hiroyuki; Uchino, Nobuhiko; and Okazaki, Masaki, 4,987,062, Cl. 430-546.000.
Okazaki, Yuichi, to Agency of Industrial Science & Technology; and Ministry of International Trade & Industry. Micro-positioning tool post. 4,986,150, Cl. 82-137.000.
Oki Electric Industry Co., Ltd.: *See—*
Fukuda, Yasuhiro; and Kitazawa, Shooji, 4,987,464, Cl. 357-23.800.
Okuda, Hajime: *See—*
Ishikawa, Masayuki; Okuda, Hajime; Shiozawa, Hideo; Itaya, Kazuhiko; Watanabe, Yukio; Suzuki, Mariko; and Hatakoshi, Genichi, 4,987,096, Cl. 437-129.000.
Okudaira, Sadayuki: *See—*
Tachi, Shinichi; Tsujimoto, Kazunori; and Okudaira, Sadayuki, 4,986,877, Cl. 156-643.000.
Okuma Mahinery Works Ltd.: *See—*
Narushima, Hiroshi; and Kawai, Sumio, 4,986,704, Cl. 409-233.000.
Okumoto, Takaharu: *See—*
Teramoto, Mitsutake; Saito, Shinkichi; Okumoto, Takaharu; and Asabuki, Hideyo, 4,986,541, Cl. 273-77.00A.
Okumura, Michio: *See—*
Fushiya, Fusao; and Okumura, Michio, 4,986,369, Cl. 173-12.000.
Okuno, Masahiko; and Kanayama, Yoshitaka, to Merbabu Corporation. Method of improving quality of mortar or concrete structures and additives therefor. 4,986,854, Cl. 106-665.000.
Okuno, Tetsuya, to Senju Metal Industry Co., Ltd. Electric panel heater with uniform emissions of infrared rays and warm air. 4,987,290, Cl. 392-375.000.
Olin Corporation: *See—*
Dennis, William G., Jr., 4,986,019, Cl. 42-69.010.
Oliver, Raymond; Smith, Jeremy G. B.; and Villamagna, Fortunato, to Imperial Chemical Industries PLC. Emulsification method. 4,986,858, Cl. 149-109.600.
Oliver, Willie R. Waterproof dishwashing mitten. 4,986,681, Cl. 401-7.000.
Olivier, Jean; and Pribat, Didier, to Thomson-CSF. Method of making an integrated component of the cold cathode type. 4,986,787, Cl. 445-24.000.
Olsen, Steven P., to Luk Lamellen und Kupplungsbau GmbH. Torque converter clutch. 4,986,398, Cl. 192-3.280.
Olshansky, Leonard: *See—*
Mintz, David; and Olshansky, Leonard, 4,986,055, Cl. 53-526.000.
Olympus Optical Co., Inc.: *See—*
Takase, Tsugiko; Adachi, Hideo; Okada, Takao; Shimazu, Hisanari; and Tomabechi, Hideo, 4,987,303, Cl. 250-306.000.
Olympus Optical Co., Ltd.: *See—*
Gotanda, Masakazu; and Ueda, Yasuhiro, 4,987,314, Cl. 250-551.000.
Ikegame, Tetsuo, 4,987,565, Cl. 369-44.150.
Kanno, Toshiyuki; and Watanabe, Hitoshi, 4,987,021, Cl. 428-64.000.
Omura, Yasuhiro; Sakai, Mitsugu; Karaki, Koichi; and Sasaki, Yasuo, 4,986,125, Cl. 73-606.000.
Ushikubo, Masao, 4,986,965, Cl. 422-102.000.
Yokota, Akira; Fukuda, Hiroyuki; and Takahashi, Susumu, 4,986,642, Cl. 350-432.000.
Omata, Kazuki: *See—*
Tatematsu, Shinzo; Omata, Kazuki; Hashimoto, Tatsuo; Takahashi, Masato; and Ito, Noriichi, 4,987,031, Cl. 428-402.200.
Omi, Kiyonobu: *See—*
Sawaguchi, Ikuo; and Omi, Kiyonobu, 4,986,182, Cl. 101-483.000.
Omura, Yasuhiro; Sakai, Mitsugu; Karaki, Koichi; and Sasaki, Yasuo, to Olympus Optical Co., Ltd. Ultrasonic microscope. 4,986,125, Cl. 73-606.000.
On-Gard Systems, Inc.: *See—*
Steiner, Eric L.; Weiss, Mark E.; and Samson, Jeffrey T., 4,986,816, Cl. 604-192.000.
Oneda, Shogo; and Hanyu, Yoshiaki, to Ricoh Company, Ltd. Straight line drawing control apparatus. 4,987,553, Cl. 364-521.000.
O'Neill, William; and Warne, James R., to Medical & Scientific Enterprises, Inc. Method of radiologically scanning the spine for messuring bone density. 4,986,273, Cl. 128-653.00R.
O'Neill, William J., to National-Standard Company. Localization needle assembly with reinforced needle assembly. 4,986,279, Cl. 128-754.000.
Onizawa, Yoshio: *See—*
Izuka, Akihiro; Onizawa, Yoshio; and Yamashita, Mitsuru, 4,986,938, Cl. 264-1.300.
Ono, Hideo: *See—*
Ryu, Ushio; Ono, Hideo; Kabashima, Kengi; Masushige, Yutaka; Matsuo, Teruhiko; and Koyanagi, Tadashi, 4,986,483, Cl. 242-45.000.
Ono, Hisao: *See—*
Sato, Hozumi; Shimada, Humito; Sakaguchi, Akio; Takemura, Yasuhiko; Nishi, Tadaaki; Ono, Hisao; Nagano, Masanobu; and Miyachi, Takumi, 4,987,017, Cl. 428-36.800.
Ono, Hitoshi: *See—*
Suzuki, Tetsumi; Murayama, Tetsuo; Ono, Hitoshi; and Ando, Osamu, 4,987,045, Cl. 430-59.000.
Ono, Takuro, to Aisin Seiki Kabushiki Kaisha. Heat exchanger. 4,986,349, Cl. 165-154.000.
Onodera, Tsutomu: *See—*
Itoh, Kenichiro; Yamada, Takeshi; Onodera, Tsutomu; Yoshinuma, Mikio; and Kato, Yasuyuki, 4,986,843, Cl. 65-152.000.
Ooe, Masayuki: *See—*
Yamaguchi, Keizaburo; Ooe, Masayuki; and Yamaguchi, Akihiro, 4,987,261, Cl. 564-428.000.
Oosawa, Shinji: *See—*
Shibata, Hidenori; Iesaka, Mamoru; and Oosawa, Shinji, 4,987,466, Cl. 357-24.000.
Oota, Tadaki: *See—*
Inoue, Ryuzaburo; and Oota, Tadaki, 4,986,241, Cl. 123-479.000.
Oppawsky, Steffen; and Burckhardt, Holger, to Heraeus Kulzer GmbH. Positively ventilated fingernail irradiation device. 4,987,310, Cl. 250-492.100.
Orikasa, Yuichi; and Sakazume, Suehiro, to Nippon Petrochemicals Co., Ltd.; and Nippon Oil & Fats Co., Ltd. Thermoplastic resin composition and method for preparing the same. 4,987,165, Cl. 523-435.000.
Oros, Alvin K.; Noworyta, Rudolf P.; and Sawyer, Fred G., to Ford Motor Company. Quick setting angle device for a welding torch. 4,986,002, Cl. 33-354.000.
Orszagos Foldtani Kutano es Furo Vallalat: *See—*
Pera, Ferenc; Szentai, Gyorgy; Kesseru, Zsolt; Toth, Peter; and Kapolyi, Laszlo , 4,986,696, Cl. 405-36.000.
Osaka Gas Company Limited: *See—*
Maeda, Toyohiro, 4,986,895, Cl. 208-39.000.
Osaka Titanium Co., Ltd.: *See—*
Yamada, Takayuki; and Kii, Takeshi, 4,986,215, Cl. 118-728.000.
Osaki, Tatsuo, to Yoshida Kogyo K. K. Method of and apparatus for applying top end stops on to a slide fastener chain. 4,985,977, Cl. 29-408.000.
Osawa, Nobuyuki; and Mizumura, Yoshinori, to Nippon Seiko Kabushiki Kaisha. Attaching device for a dust cover of a linear guide apparatus. 4,986,508, Cl. 248-300.000.
Osawa, Tadao: *See—*
Sekine, Yoshihito; Arai, Nobukatsu; Osawa, Tadao; Tokuda, Hiroatsu; Usui, Toshifumi; and Tsutsui, Mitsukuni, 4,986,115, Cl. 73-118.200.
Osgood, Melvin L.: *See—*
Bremers, Alan D.; and Osgood, Melvin L., 4,986,300, Cl. 137-315.000.
Oshima, Kenji; and Kito, Yasutami, to Otis Elevator Company. Multiphase multiplier. 4,987,320, Cl. 307-498.000.
Oshima, Takehiro: *See—*
Magota, Koji; Oshima, Takehiro; and Tanaka, Shoji, 4,987,070, Cl. 435-69.700.
Ostrowsky, Efrem M.: *See—*
Lina, Jean-Pierre; Pennaneach, Herve ; Ostrowsky, Efrem M.; and Moore, David G., 4,986,453, Cl. 222-321.000.
Oswald, Gerald L.: *See—*
Jacob, Merritt; Oswald, Gerald L.; and Goffin, Glen P., II, 4,986,183, Cl. 102-200.000.
Ota, Mitsunobu: *See—*
Yamanishi, Akio; Kamezawa, Hitoshi; Sakai, Takao; Tsuji, Sadafusa; and Ota, Mitsunobu, 4,986,665, Cl. 356-402.000.
Ota, Shinichi; and Kawasaki, Keiichi, to Canon Kabushiki Kaisha. Laser irradiating apparatus and laser recording apparatus using the same. 4,987,426, Cl. 346-108.000.
Otaka, Masahiro: *See—*
Ishikawa, Yuichi; Yoshimura, Toshihiko; Shimizu, Tasuku; Otaka, Masahiro; and Takaku, Kazuo, 4,987,367, Cl. 324-227.000.
Otis Elevator Company: *See—*
Oshima, Kenji; and Kito, Yasutami, 4,987,320, Cl. 307-498.000.
Salmon, John K., 4,986,391, Cl. 187-1.00R.
Otis Engineering Corp.: *See—*
Cooksey, Andrew G., 4,986,690, Cl. 403-319.000.

Laky, Tibor; and Fowler, Stewart H., Jr., 4,986,360, Cl. 166-351.000.
Otsuka, Fumio: *See—*
Kimura, Koichi; Matsumoto, Takeshi; and Otsuka, Fumio, 4,986,676, Cl. 400-124.000.
Otsuka, Ichiro: *See—*
Ishida, Yuzuru; Mitsuboshi, Masahiro; Inoue, Haruo; Otsuka, Ichiro; and Iio, Keiji, 4,987,170, Cl. 524-267.000.
Ott, Siegfried; and Wimmer, Friedrich. Cap for the filler neck of liquid containers. 4,986,439, Cl. 220-334.000.
Otte, Timothy J., to Bemis Manufacturing Company. Toilet seat hinge assembly. 4,985,939, Cl. 4-240.000.
Otten, David: *See—*
Ofori-Tenkorang, John; Otten, David; and Casey, Leo, 4,987,372, Cl. 324-705.000.
Otto, Gerhard; and Tamaschke, Walter, to C. Gehrens AG. Sheet working machine with tool magazine. 4,985,983, Cl. 29-568.000.
Outboard Marine Corporation: *See—*
Brown, Peter W., 4,986,231, Cl. 123-193.00P.
Irgens, Christopher R.; and Bailey, Francis V., 4,986,942, Cl. 264-51.000.
Outboard Marine Corproation: *See—*
Binversie, Gregory J.; and Macier, James E., 4,986,773, Cl. 440-61.000.
Overlach, Knud: *See—*
Hartmann, Rudolf; Overlach, Knud; and Suchanek, Gunter, 4,986,004, Cl. 33-555.100.
Owada, Toshinobu: *See—*
Iwamoto, Masatoshi; and Owada, Toshinobu, 4,986,386, Cl. 180-209.000.
Owens, Robert C.; and Rydell, Mark A., to Schneider (U.S.A.) Inc. Valvuloplasty catheter with balloon which remains stable during inflation. 4,986,830, Cl. 606-194.000.
Owsley, Dennis C.: *See—*
Day, Richard J.; Harlow, Harry B.; and Owsley, Dennis C., 4,987,266, Cl. 568-584.000.
Oya, Eiichi; Watanabe, Junichi; Kondo, Yasuo; Kakuta, Takuya; Suzuki, Koichi; Nawamaki, Tsutomu; and Watanabe, Shigeomi, to Nissan Chemical Industries Ltd. Pyrazole derivatives and herbicides containing them. 4,986,845, Cl. 71-92.000.
Oyoshi, Keiji; Tagami, Takashi; and Tanaka, Shuhei, to Nippon Sheet Glass Co., Ltd. Method of preparing an alkali metal diffusion preventive layer. 4,986,841, Cl. 65-30.130.
Ozaki, Seishiro; and Asahi, Nobuo, to Fuji Electric Co., Ltd. Circuit breaker alarm-switch operating apparatus. 4,987,395, Cl. 335-17.000.
Ozawa, Shuji: *See—*
Gohbara, Masatoshi; Asano, Tamotsu; Ozawa, Shuji; Yamazaki, Hideo; Ishii, Tsutomu; Nishida, Makoto; Watanabe, Junko; and Sato, Naoki, 4,986,846, Cl. 71-92.000.
Ozeki, Hiroaki; Sakashita, Seiji; and Kanno, Ippei, to Matsushita Electric Industrial Co., Ltd. Wide band transmission system with biasing of gain control circuit. 4,987,606, Cl. 455-188.000.
P.F.M. S.p.A.: *See—*
Fioravanti, Pietro, 4,986,872, Cl. 156-515.000.
Pacific Chemical Co., Ltd.: *See—*
Kim, Young D.; and Ha, Byung J., 4,987,183, Cl. 525-59.000.
Padmakumar, Bala: *See—*
Malazgirt, Alp; Padmakumar, Bala; and Bhattacherjee, Arya, 4,986,878, Cl. 156-643.000.
Padwa, Allen R.: *See—*
Udipi, Kishore; and Padwa, Allen R., 4,987,187, Cl. 525-173.000.
Pagano, Daniel M.; and Miller, Stephen H., to Eastman Kodak Company. Film cassette with film exposure status indicator. 4,987,437, Cl. 354-275.000.
Palino, Douglas F.: *See—*
Schlesinger, Randall L.; Eastman, Kevin M.; and Palino, Douglas F., 4,987,475, Cl. 357-70.000.
Pallet Systems, Inc.: *See—*
Gwathmey, Richard B., 4,986,418, Cl. 206-386.000.
Palmer, Bruce R.: *See—*
Kauffman, James W.; and Palmer, Bruce R., 4,987,164, Cl. 524-413.000.
Palmer, George T.: *See—*
Den Hartog, Herman C.; and Palmer, George T., 4,987,177, Cl. 524-517.000.
Pampaloni, Guido: *See—*
Calderazzo, Fausto; Pampaloni, Guido; Masi, Francesco; Moalli, Angelo; and Invernizzi, Renzo, 4,987,111, Cl. 502-113.000.
Panel Technology, Inc.: *See—*
Leslie, Robert H., 4,986,871, Cl. 156-494.000.
Panter, Scott C.; and Van Vessum, Leon C. Anti-theft guard for wing window latch safety button. 4,986,585, Cl. 292-346.000.
Panyard, James R.; and Winter, Benjamin P., to Ford Motor Company. Method of joining cylinder bore liners to an engine block. 4,986,230, Cl. 123-193.00C.
Parish, Darrell J., to Du Pont de Nemours, E. I., and Company. Polyimide articles of intermediate electrical conductivity and a process for making them. 4,986,946, Cl. 264-104.000.
Parkhurst, Larry S.: *See—*
Montgomery, Jerry A.; and Parkhurst, Larry S., 4,986,446, Cl. 222-94.000.
Parks, David R.: *See—*
Moore, Wayne A.; Nozaki, Tom, Jr.; Parks, David R.; Stovel, Richard T.; and Breitbard, Gary, 4,987,539, Cl. 364-413.080.
Parsons, Peter J., to British Gas plc. Method of adsorption. 4,986,899, Cl. 208-310.00R.
Pastryk, Jim J.; Cur, Nihat O.; Hardaway, Anthony H.; and Euler, John W., to Whirlpool Corporation. Fluid recirculation system for an automatic washer. 4,986,093, Cl. 68-13.00R.
PAT Messtechnik GmbH: *See—*
Hartmann, Rudolf; Overlach, Knud; and Suchanek, Gunter, 4,986,004, Cl. 33-555.100.
Patten, Donald O., Jr.: *See—*
Miller, Bradley J.; and Patten, Donald O., Jr., 4,987,035, Cl. 428-599.000.
Patti, Anthony G.; DeHart, Larry L., Sr.; and DeHart, Larry L., Jr., to All Tech Industries. Truck bed liner. 4,986,590, Cl. 296-39.200.
Patzer, Juergen: *See—*
Meffert, Peter; Schwarz, Heinrich; and Patzer, Juergen, 4,986,800, Cl. 475-113.000.
Patzold, Walter: *See—*
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Paul Wurth S.A.: *See—*
Lonardi, Emile, 4,986,516, Cl. 266-87.000.
Paulson, Harold E. Printing press feed mechanism. 4,986,522, Cl. 271-2.000.
Paust, Joachim: *See—*
Dobler, Walter; Eggersdorfer, Manfred; and Paust, Joachim, 4,987,229, Cl. 544-243.000.
Pavlik, Dennis: *See—*
Schron, Dean; Kemeny, George A.; Pavlik, Dennis; and Stefani, Francesco, 4,986,161, Cl. 89-8.000.
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Beinhaur, Ernest L.; Henschen, Homer E.; McKee, Michael J.; and Pawlikowski, Joseph M., 4,987,283, Cl. 219-85.110.
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Pearson, Keith V.: *See—*
Webster, Jackie R.; Pearson, Keith V.; Chang, David B.; Moise, Norton L.; and Vali, Victor, 4,987,582, Cl. 378-85.000.
Pedemonte, Enrico: *See—*
Ruso, Saverio; Alfonso, Giovanni C.; Pedemonte, Enrico; Turturro, Antonio; and Martuscelli, Ezio, 4,987,189, Cl. 525-183.000.
Peek, Thomas W.; and Floyd, John B., to Bio-AgriTech, Inc. Insect trap. 4,986,024, Cl. 43-107.000.
Peerless-Winsmith, Inc.: *See—*
Heller, Werner H., 4,986,400, Cl. 192-26.000.
Pelgrom, Marcellinus J. M.; Jochijms, Antonius J. G.; and Van Roermund, Arthur H. M., to U.S. Philips Corp. Charge transfer device having capacitive feedback. 4,987,580, Cl. 377-60.000.
Pellinghelli, Ferruccio: *See—*
Ziliani, Rino; Ziveri, Giuseppe; and Pellinghelli, Ferruccio, 4,986,301, Cl. 137-315.000.
Peltonen, Esko J., to Tamglass Oy. Heat transfer method in a glass sheet bending furnace and bending furnace. 4,986,842, Cl. 65-104.000.
Pennaneach, Herve : *See—*
Lina, Jean-Pierre; Pennaneach, Herve ; Ostrowsky, Efrem M.; and Moore, David G., 4,986,453, Cl. 222-321.000.
Pentel kabushiki Kaisha: *See—*
Yamamoto, Tadashi; Takai, Kazumitsu; and Shimizu, Akira, 4,987,332, Cl. 310-309.000.
Pera, Ferenc; Szentai, Gyorgy; Kesseru, Zsolt; Toth, Peter; and Kapolyi, Laszlo , to Veszpremi Szenbanyak; Kozponti Banyaszati Fejlesztesi Intezet; and Orszagos Foldtani Kutano es Furo Vallalat. Method of dewatering a substerranean space, especially a mine. 4,986,696, Cl. 405-36.000.
Perler, Robert F. Locking device preventing reuse of a disposable syringe. 4,986,812, Cl. 604-110.000.
Perliski, Dennis: *See—*
Mozuras, Gary; Perliski, Dennis; and Carnick, Robert C., 4,986,034, Cl. 49-505.000.
Perna, Peter J.: *See—*
Speights, Robert M.; Perna, Peter J.; and Downing, Steven L., 4,987,124, Cl. 514-23.000.
Perr, Julius P.: *See—*
Warlick, Timothy A.; Campbell, Jeffrey L.; Peters, Lester L.; Lucas, Michael E.; Perr, Julius P.; and Wan, Kuang-Wen T., 4,986,472, Cl. 239-88.000.
Perrin, Gabrielle: *See—*
Boscher, Daniel; Le Marer, Rene ; and Perrin, Gabrielle, 4,986,627, Cl. 350-96.210.
Perry, George W. Sports sleeve. 4,985,934, Cl. 2-125.000.
Persson, Per I., to Exploweld AB. Method of constructing tools intended for use in work carried out with the aid of shock-wave generating energy sources. 4,986,461, Cl. 228-57.000.
Peter, Roland: *See—*
Holoch, Jan; Peter, Roland; Eisenbarth, Philipp; and Allspach, Thomas, 4,987,264, Cl. 568-33.000.
Peters, Donald S., to Man-Gill Chemical Company. Recovery of useful products from by-products of phosphate conversion coating process. 4,986,977, Cl. 423-592.000.
Peters, Horst: *See—*
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Warlick, Timothy A.; Campbell, Jeffrey L.; Peters, Lester L.; Lucas, Michael E.; Perr, Julius P.; and Wan, Kuang-Wen T., 4,986,472, Cl. 239-88.000.

Peters, Manfred: *See*—
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Petersen, Kurt H.; and Rios, Juan P., to Minnesota Mining and Manufacturing Company. Socket for tab burn-in and test. 4,986,760, Cl. 439-71.000.
Petitou, Maurice: *See*—
Choay, Jean; Jacquinet, Jean-Claude; Petitou, Maurice; and Sinay, Pierre, 4,987,223, Cl. 536-17.700.
Petri, Alberto, to Enichem Tecnoresine S.p.A. Flame-proof polycarbonates containing units deriving from halogenated macrocyclic compounds. 4,987,269, Cl. 568-720.000.
Petricevic, Vladimir: *See*—
Alfano, Robert R.; and Petricevic, Vladimir, 4,987,575, Cl. 372-41.000.
Petrie, Gregory A.: *See*—
Hieb, Larry E.; Petrie, Gregory A.; and Carter, Daniel S., 4,986,615, Cl. 312-45.000.
Petro-Well Supply, Inc.: *See*—
Blanton, James R., 4,986,727, Cl. 417-57.000.
Pettit, George R.; and Kamano, Yoshiaki, to Arizona Board of Regents. Isolation and structural elucidation of the cytostatic linear depsipeptides dolastatin 13 and dehydrodolastatin 13. 4,986,988, Cl. 424-520.000.
Petzold, Rainer; and Wiencek, Norbert, to Zahnradfabrik Friedrichshaften AG. Device for controlling an automatic motor-vehicle clutch. 4,986,401, Cl. 192-0.032.
Peyret, Lucien. Rack for assembling, inspecting and repairing vehicle bodies. 4,986,107, Cl. 72-457.000.
Pezzoni, Gabriella: *See*—
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Haen, William G.; and Pfefferkorn, Earle L., 4,986,254, Cl. 126-41.00R.
Pfeiffer, Dorothea: *See*—
Nentwig, Jurgen; Scheller, Frieder; Hanke, Gunter; Breitmoser, Wolfgang; Weise, Hartmut; Pfeiffer, Dorothea; Nunchert, Anette; Schubert, Florian; Meiske, Christoph; and Kuhnel, Siegfried, 4,987,075, Cl. 435-182.000.
Pfizer Inc.: *See*—
Friedmann, Robert C.; and Quallich, George J., 4,987,231, Cl. 546-135.000.
Pickell, Frank W.; Varesic, John Z.; Melton, M. Shannon; and Melton, Sidney H., to Amoco Corporation. Furnace for oil refineries and petrochemical plants. 4,986,222, Cl. 122-6.00R.
Pickens, Carl; and McCurry, Patrick M., to Henkel Kommanditgesellschaft auf Aktien. Removal of water miscible materials from glycoside mixtures. 4,987,225, Cl. 536-124.000.
Pierburg GmbH: *See*—
Losing, Karl-Heinrich; and Schauer, Walter, 4,986,123, Cl. 73-204.260.
Pierce, Brian M.: *See*—
Chang, David B.; and Pierce, Brian M., 4,986,639, Cl. 350-354.000.
Piget, Marie-Christine: *See*—
Ragueneau, Jean-Pierre; Klima, Rene; and Piget, Marie-Christine, 4,986,191, Cl. 105-168.000.
Pigneri, Anthony M., to Shell Oil Company. Dipropargyl ether of alpha, alpha'-bis (4-hydroxypenyl)-paradiisopropylbenzene. 4,987,272, Cl. 568-640.000.
Pinault, Daniel: *See*—
Knobbe, Alan J.; Pintelon, Joseph A. E.; and Pinault, Daniel, 4,987,001, Cl. 427-28.000.
Pintelon, Joseph A. E.: *See*—
Knobbe, Alan J.; Pintelon, Joseph A. E.; and Pinault, Daniel, 4,987,001, Cl. 427-28.000.
Pipe Liners, Inc.: *See*—
Ledoux, Patrick R.; and Fourgaut, Luc R., 4,986,951, Cl. 264-516.000.
Pittsburgh Corning Corporation: *See*—
McMarlin, Robert M., 4,986,048, Cl. 52-306.000.
Pittway Corporation, The: *See*—
Lina, Jean-Pierre; Pennaneach, Herve ; Ostrowsky, Efrem M.; and Moore, David G., 4,986,453, Cl. 222-321.000.
Placon Corporation: *See*—
Borst, Rodney D., 4,986,438, Cl. 220-315.000.
Plastilite Corporation: *See*—
Bucholz, Frederick S., 4,986,023, Cl. 43-44.870.
Pleasants, Charles W. Running tool for use with reeled tubing and method of operating same. 4,986,362, Cl. 166-382.000.
Plessey Overseas Limited: *See*—
Leslie, Thomas C., 4,987,416, Cl. 341-118.000.
Pohl, Ludwig: *See*—
Eidenschink, Rudolf; Haas, Gunther; Pohl, Ludwig; Romer, Michael; Scheuble, Bernhard; and Weber, Georg, 4,986,931, Cl. 252-299.630.
Poklemba, John J.; and Thomas, James R., to Communications Satellite Corporation. Coherent phase and frequency recovery method and circuit. 4,987,386, Cl. 331-10.000.
Polaroid Corporation: *See*—
Hudspeth, William, 4,987,441, Cl. 355-50.000.
Pollack, Ronald M. Poster frame. 4,986,013, Cl. 40-152.000.
Polyplastics Co., Ltd.: *See*—
Nakane, Toshio; Hijikata, Kenji; Iiyama, Makoto; Kageyama, Yukihiko; and Naka, Michirou, 4,987,167, Cl. 524-95.000.
Pommerening, Bruce, to Evans Hydrotherapy Corp. Hydrotherapy machine. 4,985,941, Cl. 4-495.000.
Ponticelli, Robert J. Radio installation kit with convertible front panel. 4,986,499, Cl. 248-27.100.
Poole, Dan B.: *See*—
Underwood, John P.; and Poole, Dan B., 4,986,368, Cl. 172-394.000.
Popovic, Radivoje, to LGZ Landis & Gyr Zug AG. Integratable hall element. 4,987,467, Cl. 357-27.000.
Posner, Elieser S.; and Li, Yuzhou, to Kansas State University Research Foundation. Method of separating wheat germ from whole wheat. 4,986,997, Cl. 426-622.000.
Posso, Patrick P., to Posso S.A. Box for the storage, display and selection of diskettes or other magnetic members. 4,986,415, Cl. 206-45.230.
Posso S.A.: *See*—
Posso, Patrick P., 4,986,415, Cl. 206-45.230.
Post Medical, Inc.: *See*—
Thead, William H.; and Evans, John C., 4,986,811, Cl. 604-110.000.
Potter, Mark J.: *See*—
Kao, Jar-Lin; Nadler, Murray; Potter, Mark J.; and Martir, Roque V., 4,987,109, Cl. 502-66.000.
Pottinger, Marion G., to Uniroyal Goodrich Tire Company, The. Apparatus for measuring tire tread force and motion. 4,986,118, Cl. 73-146.000.
Poturaev, Valentin N.; Chervonenko, Alfred G.; Morus, Vladimir L.; and Lavrukhin, Viktor A. Method of screening solid materials and apparatus for performing same. 4,986,422, Cl. 209-326.000.
Pournain, Michel A.; Loncle, Jean-Pierre A.; and Colombie, Francis J., to Siemens-Bendix Automotive Electronics. System for putting electronic units connected to a communications channel into an operational state or into a stand by state. 4,987,317, Cl. 307-40.000.
Powell, Harold: *See*—
Law, Donel G.; and Powell, Harold, 4,986,427, Cl. 211-64.000.
Power, Leslie B.: *See*—
Prewer, John R.; and Power, Leslie B., 4,986,040, Cl. 52-79.100.
Prewer, John R.; and Power, Leslie B., 4,986,041, Cl. 52-79.500.
Power, Richard S., to Interior Creators, Inc. Head track system and method. 4,986,047, Cl. 52-238.100.
PPG Industries, Inc.: *See*—
Kwiatkowski, Patricia L.; and Knowles, David B., 4,986,934, Cl. 252-586.000.
Praat, Cornelis N. A.; and Veld, Lambertus, to Hoogovens Groep B.V. Method for determining a leak in a breast wall of a regenerative heat recuperator. 4,986,749, Cl. 432-28.000.
Prakash, Chacko; Ng, Yong K.; and Teo, Pek B., to Motorola, Inc. Crystal oscillator operated in parallel/series mode. 4,987,388, Cl. 331-158.000.
Precht, Hans-Jurgen, to Robert KRUPS Stiftung & Co. KG. Device for reinforcing liquid-dispensing containers in apparatus for making hot beverages. 4,986,171, Cl. 99-279.000.
Precision Image Corporation: *See*—
Finley, Ronald B.; Day, Gene F.; and Devine, David J., 4,987,429, Cl. 346-157.000.
Precision Roofing Accessories Co. Pty.: *See*—
Long, Graham, 4,986,950, Cl. 264-310.000.
Prescher, Guenter: *See*—
Kruppa, Steffen; Buchler, Johann; Schmidt, Manfred; and Prescher, Guenter, 4,987,226, Cl. 540-145.000.
President and Fellows of Harvard, The: *See*—
Neenan, Thomas X.; and Whitesides, George M., 4,987,209, Cl. 526-243.000.
Prestileo Industries, Inc.: *See*—
Prestyly, Robert V., Jr., 4,986,434, Cl. 220-83.000.
Preston, Donald G. Marine engine oil drainage device. 4,986,777, Cl. 440-88.000.
Preston, Stuart; Holloran, Robert; and Lidgate, Brian, to George Angus & Company Limited. Shaft seal. 4,986,553, Cl. 277-152.000.
Prestyly, Robert V., Jr., to Prestileo Industries, Inc. Dish and method for serving string-form foods. 4,986,434, Cl. 220-83.000.
Preukschat, Alfred; and Ackermann, Norbert, to Boge AG. Adjustable vibration dampers for motor vehicles. 4,986,393, Cl. 188-299.000.
Prevent-A-Crime International, Inc.: *See*—
Jack, David E., 4,987,287, Cl. 219-121.690.
Preves, David A.; Rosengren, Brian P.; Holte, James E.; and Leonard, Myer S., to Starkey Laboratories, Inc. Method for obtaining a signal for analyzing human and animal joint functions. 4,986,281, Cl. 128-782.000.
Prewer, John R.; and Power, Leslie B., to Inventio AG. Modular elevator shaft. 4,986,040, Cl. 52-79.100.
Prewer, John R.; and Power, Leslie B., to Inventio AG. Prefabricated elevator shaft modules. 4,986,041, Cl. 52-79.500.
Pribat, Didier: *See*—
Olivier, Jean; and Pribat, Didier, 4,986,787, Cl. 445-24.000.
Price, Chester. Weed puller with plug ejecting means. 4,986,588, Cl. 294-50.700.
Pringle, Ronald E. Well tool having a variable area hydraulic actuator. 4,986,357, Cl. 166-319.000.
Proconics International, Inc.: *See*—
Ohlenbusch, Cord W., 4,986,729, Cl. 414-787.000.
Proctor & Gamble Company, The: *See*—
Gunn, Charles L.; and Apke, Robert J., 4,986,420, Cl. 206-607.000.
Mackey, Larry N.; and Seyed-Rezai, Seyed E., 4,986,882, Cl. 162-109.000.
Product Carousel Inc.: *See*—
Lawson, Richard L., 4,985,964, Cl. 452-135.000.
Productech Inc.: *See*—
Zimmer, Gero, 4,986,463, Cl. 228-205.000.

Prokschy, Frank: *See*—
Dietz, Erwin; Kapaun, Gustav; Kappert, Michael; Prokschy, Frank; Kroh, Adolf; and Urban, Manfred, 4,986,852, Cl. 106-498.000.

Prombo, Patrick: *See*—
Yatka, Robert; Prombo, Patrick; Barabolak, Roman M.; Zibell, Steven; and McGrew, Gordon N., 4,986,991, Cl. 426-3.000.

Pu, Lyong S.: *See*—
Ageishi, Kentaro; and Pu, Lyong S., 4,986,935, Cl. 252-587.000.

Pugh, David R.: *See*—
Ford, David A.; Higginbotham, Gordon J. S.; Pugh, David R.; and Kumar, Naresh, 4,986,517, Cl. 266-234.000.

Pulsecom Division of Hubbell Incorporated: *See*—
Monette, Jean-Yves; and Desabrais, Sylvain, 4,987,573, Cl. 370-111.000.

Quallich, George J.: *See*—
Friedmann, Robert C.; and Quallich, George J., 4,987,231, Cl. 546-135.000.

Quantschnigg, Heribert: *See*—
Rotter, Franz; Nayer, Wolfgang; Quantschnigg, Heribert; and Sattler, Erich, 4,986,498, Cl. 246-458.000.

Quentin, Jean-Pierre: *See*—
Bonnebat, Claude; Quentin, Jean-Pierre; and Morin, Alain, 4,987,020, Cl. 428-64.000.

Quintana, Julio: *See*—
Mueller, Mark D.; Jones, Frank; Quintana, Julio; Ruddy, Kenneth E.; and Mims, Michael, 4,986,361, Cl. 166-381.000.

Quinting, Franz R., to Chrysler Corporation. Attachment mechanism. 4,986,570, Cl. 280-808.000.

R. J. Reynolds Tobacco Company: *See*—
Roberts, Donald L.; and Fernandez, Carmen C., 4,986,286, Cl. 131-290.000.

R.W.Q., Inc.: *See*—
Frohlich, Sigurd, 4,986,870, Cl. 156-382.000.

Raab, Reginald S., to Big Chill, Inc. Adjustable refrigeratable beverage wrap around holder. 4,986,089, Cl. 62-457.400.

Rabe, Jurgen: *See*—
Neuwirth, Ernst; Rabe, Jurgen; and Ritter, Joachim, 4,986,402, Cl. 192-45.000.

Rabilloud, Guy: *See*—
Malinge, Jean; Rabilloud, Guy; and Sillion, Bernard, 4,987,218, Cl. 528-353.000.

Rabindran, K. George; Filicicchia, David; and Guenther, Kenneth L., to Bell & Howell Phillipsburg Company. Insertion machine with speed optimization. 4,987,547, Cl. 364-478.000.

Radunz, Hans-Eckart: *See*—
Kurmeier, Hans-Adolf; Weber, Wolf-Dietrich; Radunz, Hans-Eckart; and Schliep, Hans-Jochen, 4,987,133, Cl. 514-252.000.

Radzio, Andrzej; and Stems, Wolfgang, to Korber AG. Method and apparatus for ascertaining the density of wrapped tobacco fillers and the like. 4,986,285, Cl. 131-280.000.

Rae, Rory: *See*—
Kaczmarczyk, Edward T.; and Rae, Rory, 4,986,722, Cl. 414-723.000.

RAF Industries, Inc.: *See*—
Lieberman, Harry A.; and Stoddart, Kenneth R., 4,985,959, Cl. 15-230.110.

Ragueneau, Jean-Pierre; Klima, Rene; and Piget, Marie-Christine, to Regie Autonome Des Transports Parisiens. Railway vehicle whose weight is distributed on four axles which are steerable relative to the body. 4,986,191, Cl. 105-168.000.

Rai, Vish; Dailey, Nils; Southall, Kenneth; Webster, Timothy; Leeke, Gordon; and Chu, Chaokang, to Cuno Incorporated. Chromatography column. 4,986,909, Cl. 210-198.300.

Ramachandran, Ramakrishnan; Shukla, Yagya; and MacLean, Donald L., to BOC Group, Inc., The. Process for the production of anhydrides. 4,987,239, Cl. 549-250.000.

Ramakrishnan, Ramani; and Ball, Norman, to M & I Heat Transfer Products Ltd. Air handling system. 4,986,170, Cl. 98-33.100.

Rambold, Adolf, to Teepack Spezialmaschinen GmbH & Co. KG. Arrangement for supplying and dosing loose filling material. 4,986,455, Cl. 222-368.000.

Ramel, Urs A.: *See*—
Allen, Michael P.; Ramel, Urs A.; and DeLizza, Anthony J., 4,987,085, Cl. 436-169.000.

Rankin, Peggy J.: *See*—
Collett, Michael F.; and Rankin, Peggy J., 4,986,419, Cl. 206-387.000.

Ratajac, Aleksandar: *See*—
Langlois, Jean C.; Dubie, Gary; and Ratajac, Aleksandar, 4,986,551, Cl. 273-182.00R.

Rathbun, Gordon G. Tether for a drill chuck key. 4,986,554, Cl. 279-1.00K.

Rauleder, Hartwig; Kotzsch, Hans-Joachim; and Vahlensieck, Hans-Joachim, to Huels Aktiengesellschaft. Process for the preparation of asymmetric terminally mono-unsaturated glycol ethers. 4,987,268, Cl. 568-616.000.

Ravid, Mordechai; Kedem, Dan; and Kedem, Uzi. Biopsy syringe device. 4,986,278, Cl. 128-753.000.

RC International, Inc.: *See*—
Chang, Robert H.; and Hayman, Peter A., 4,986,616, Cl. 312-208.000.

RCA Licensing Corporation: *See*—
Canfield, Barth A.; Fling, Russell T.; and Willis, Donald H., 4,987,493, Cl. 358-183.000.

Recchia, Walter: *See*—
De Ambrosi, Luigi; Recchia, Walter; and Ferrari, Gianni, 4,987,222, Cl. 536-21.000.

Rechitsky, Vladimir I.: *See*—
Lozhenko, Alexandr S.; Rechitsky, Vladimir I.; and Shendalev, Viktor N., 4,986,628, Cl. 350-96.290.

Recot, Inc.: *See*—
Kanafani, Henny; Longan, Bobby J.; Schmidt, Paul R.; and Wisdom, Lawrence W., 4,987,280, Cl. 219-10.55M.

Reed, Allan R., to Reed Nauticals, Inc. Boat hook device. 4,986,207, Cl. 114-221.00R.

Reed Nauticals, Inc.: *See*—
Reed, Allan R., 4,986,207, Cl. 114-221.00R.

Reel/Frame Agfa-Gevaert Aktiengesellschaft: *See*—
Helling, Gunter; and Peters, Manfred, 4,987,061, Cl. 430-531.000.

Reemtsema, Karl-Dieter; Wackermann, Peter; Ahlborn, Guenter; and Kampmann, Gerhard, to Waggon Union GmbH. Railroad freight car. 4,986,707, Cl. 410-132.000.

Regie Autonome Des Transports Parisiens: *See*—
Ragueneau, Jean-Pierre; Klima, Rene; and Piget, Marie-Christine, 4,986,191, Cl. 105-168.000.

Reichel, Lee: *See*—
Carmel, Edwin L.; DeRegnaucourt, Robert A.; and Reichel, Lee, 4,986,149, Cl. 82-1.110.

Reichenbach, Hans; Hofle, Gerhard; Augustiniak, Hermann; Bedorf, Norbert; Gerth, Klaus; Irschik, Herbert; Jansen, Rolf; Kunze, Brigitte; Schomburg, Dietmar; Steinmetz, Heinrich; Trowitzsch-Kienast, Wolfram; and Wray, Victor, to Gesellschaft fur Biotechnologische Forschung GmbH. Macrocyclic antibiotics. 4,987,072, Cl. 435-119.000.

Reid, Philip L. Security system for electrical appliances and other items with electrical circuitry. 4,987,406, Cl. 340-539.000.

Reilly, Gavin T.: *See*—
Cromar, Stephen A.; and Reilly, Gavin T., 4,986,359, Cl. 166-340.000.

Rembold, Helmut: *See*—
Kessler de Vivie, Achill; Linder, Ernst; Rembold, Helmut; Ruoff, Manfred; and Teegen, Walter, 4,986,246, Cl. 123-520.000.

Remick, Cassius D.: *See*—
Kirk, Kenneth; Remick, Cassius D.; Burns, Charles M.; and Habicher, Berthold H., 4,986,076, Cl. 62-4.000.

Rempinski, Donald R.: *See*—
Livshits, Mikhail; Lafferty, Gerald J., Jr.; and Rempinski, Donald R., 4,986,143, Cl. 74-475.000.

Reneau, Charles F.; and Brumley, E. Ray. Game feeder and improved distributor. 4,986,220, Cl. 119-57.910.

Rennie, Nigel F., to British Aerospace plc. Gyroscope control systems. 4,986,139, Cl. 74-5.400.

Renza, Ronald G.: *See*—
Goron, John; Renza, Ronald G.; Crosby, Robert J.; and Sodtalbers, Erich W., 4,986,911, Cl. 210-396.000.

Research Foundation of State University of New York, The: *See*—
Burrows, Cynthia; Yoon, Heungsik; and Wagler, Thomas R., 4,987,227, Cl. 540-452.000.
Kaufman, Arie E., 4,987,554, Cl. 364-522.000.

Reuther, Wolfgang: *See*—
Baus, Ulf; Reuther, Wolfgang; Lorenz, Gisela; and Ammermann, Eberhard, 4,987,143, Cl. 514-383.000.

Revelli, Aldo: *See*—
Li Bassi, Giuseppe; Nicora, Carlo; Broggi, Fabrizio; and Revelli, Aldo, 4,987,159, Cl. 522-36.000.

Revlon, Inc.: *See*—
Gerstein, Terry, 4,986,983, Cl. 424-070.000.

Reynolds, Robert R.: *See*—
Evans, Neil L.; Tombolato, Aldo L.; Reynolds, Robert R.; and Meisner, Robert J., 4,986,056, Cl. 53-539.000.

Rheinisch-Westfalischer Technischer Uberwachungs-Verein e.V.: *See*—
Rothmann, Werner; and Meckelburg, Hans J., 4,986,114, Cl. 73-117.000.

Rheinmetall: *See*—
Wissing, Gerd, 4,986,162, Cl. 89-24.000.

Rhone-Poulenc Chimie: *See*—
Bonneau, Lionel, 4,987,245, Cl. 556-104.000.
Bonnebat, Claude; Quentin, Jean-Pierre; and Morin, Alain, 4,987,020, Cl. 428-64.000.
Cordier, Georges, 4,987,263, Cl. 564-491.000.

Ribi, Edgar F., deceased: *See*—
Myers, Kent R.; and Ribi, Edgar F., deceased, 4,987,237, Cl. 549-222.000.

Ribi ImmunoChem Research, Inc.: *See*—
Myers, Kent R.; and Ribi, Edgar F., deceased, 4,987,237, Cl. 549-222.000.

Ribi, Karin S., personal representative: *See*—
Myers, Kent R.; and Ribi, Edgar F., deceased, 4,987,237, Cl. 549-222.000.

Riccitiello, Salvatore R.; Hsu, Ming-ta S.; and Chen, Timothy S., to United States of America, National Aeronautics and Space Administration. Boron-carbon-silicon polymers and the ceramic thereof. 4,987,201, Cl. 528-4.000.

Rice, Camilla A., to ECC America Inc. Method for producing a silicon carbide coated clay. 4,987,011, Cl. 427-215.000.

Richard, Robert G.: *See*—
Lund, Earl A. E.; Richard, Robert G.; Shankland, Ian R.; and Wilson, David P., 4,986,930, Cl. 252-182.240.

Richards-Braswell Research Corporation, The: *See*—
Braswell, Richard R., 4,986,771, Cl. 439-790.000.
Richards, John C.; and Smith, Joseph P., Jr., to General Electric Company. Fluidic multiplexer. 4,986,305, Cl. 137-625.150.
Richardson, Craig A.: *See*—
Walters, James C.; Richardson, Craig A.; and Verhulst, Michael J., 4,986,060, Cl. 56-6.000.
Richardt, Anton. Border and landscaping bricks. 4,986,042, Cl. 52-102.000.
Richter, Axel; Lardy, Patric; Schempp, Ulrich; and Glueck, Herbert, to Dr. Ing. h.c.F. Porsche AG. Arrangement for recognizing misfirings in internal combustion engines with externally controlled ignition. 4,986,232, Cl. 123-481.000.
Richter, Herbert A., to Wickes Manufacturing Company. Window regulator for vehicle doors. 4,986,029, Cl. 49-349.000.
Ricker, Dennis J.; and Foster, Richard L., to General Motors Corporation. Motor-driven antilock brake pressure modulator having differential motor performance characteristics. 4,986,614, Cl. 303-115.000.
Ricketts, Jonathan E., to J. I. Case Company. Rotor assembly for an axial-flow combine. 4,986,794, Cl. 460-67.000.
Ricoh Company, Ltd.: *See*—
Bannai, Kazunori; Koizumi, Yutaka; and Mamizuka, Mitsuru, 4,987,428, Cl. 346-157.000.
Katoh, Shunji, 4,987,449, Cl. 355-206.000.
Kobayashi, Hiroshi; Machida, Haruhiko; Akedo, Jun; and Funato, Hiroyoshi, 4,987,299, Cl. 250-231.140.
Kutami, Atsushi; and Kaneko, Yoshikazu, 4,987,046, Cl. 430-127.000.
Mochimaru, Hideaki; Komada, Kenya; Tomita, Masahiro; and Kasahara, Rikio, 4,987,446, Cl. 355-200.000.
Mochizuki, Manabu; Kurotori, Tsuneo; Tsuruoka, Ichiro; Echigo, Katsuhiro; Takenouchi, Hiroaki; and Soga, Setsuo, 4,987,457, Cl. 355-285.000.
Oneda, Shogo; and Hanyu, Yoshiaki, 4,987,553, Cl. 364-521.000.
Yoshimura, Tsuyoshi, 4,987,497, Cl. 358-452.000.
Riddell, Inc.: *See*—
Wingo, James C., Jr., 4,985,931, Cl. 2-2.000.
Riederer, Stephen J.; and Farzaneh, Farhad, to Mayo Foundation For Medical Education and Research. NMR imaging with variable repetition. 4,986,272, Cl. 128-653.00A.
Rieple, Theodore R., to Diversey Corporation. Bulk storage and handling system. 4,986,292, Cl. 134-166.00R.
Rieter Machine Works, Ltd.: *See*—
Nitschke, Heinz; and Hauschild, Werner, 4,985,966, Cl. 19-107.000.
Riley, Martyn F., to Eaton Hall Design Workshops Limited. Portable dispenser for viscous material. 4,986,454, Cl. 222-327.000.
Rilly, Gerard; and Lopez, Daniel, to Electronic-Werke Deutschland GmbH. Switching power supply. 4,987,525, Cl. 363-21.000.
Rios, Juan P.: *See*—
Petersen, Kurt H.; and Rios, Juan P., 4,986,760, Cl. 439-71.000.
Riou, Marie-Therese: *See*—
Clarisse, Christian; Le Contellec, Michel; and Riou, Marie-Therese, 4,987,430, Cl. 357-8.000.
Ritter, Joachim: *See*—
Neuwirth, Ernst; Rabe, Jurgen; and Ritter, Joachim, 4,986,402, Cl. 192-45.000.
Rittscher, Dieter: *See*—
Bastz, Henning; and Rittscher, Dieter, 4,987,313, Cl. 250-506.100.
Rivola, Luigi: *See*—
Cesari, Marco; Roggero, Arnaldo; Rivola, Luigi; and Demertzis, Yean, 4,986,962, Cl. 422-7.000.
Rizzo, Giorgio; Cilia, Giuseppe; and Gadda, Cesare, to Fiad S.P.A. Intrabuccal detector for x-ray apparatus. 4,987,307, Cl. 250-368.000.
Robert Bosch GmbH: *See*—
Bogner, Karl-Heinz, 4,987,396, Cl. 335-126.000.
Kessler de Vivie, Achill; Linder, Ernst; Rembold, Helmut; Ruoff, Manfred; and Teegen, Walter, 4,986,246, Cl. 123-520.000.
Robert KRUPS Stiftung & Co. KG: *See*—
Precht, Hans-Jurgen, 4,986,171, Cl. 99-279.000.
Roberts Bosch GmbH: *See*—
Steinmann, Helmut, 4,987,354, Cl. 318-444.000.
Roberts, Ceredig, to Micron Technology, Inc. BiCMOS process and process for forming bipolar transistors on wafers also containing FETs. 4,987,089, Cl. 437-34.000.
Roberts, Donald L.; and Fernandez, Carmen C., to R. J. Reynolds Tobacco Company. Tobacco treatment process. 4,986,286, Cl. 131-290.000.
Roberts, Lyn M.: *See*—
Johnson, Michael F.; Roberts, Lyn M.; and Cooper, David E., 4,986,099, Cl. 70-277.000.
Roberts, Ronald A.: *See*—
Vaitekunas, Jeffrey J.; and Roberts, Ronald A., 4,987,412, Cl. 340-721.000.
Roberts, Stanley: *See*—
Kaanta, Carter W.; and Roberts, Stanley, 4,987,101, Cl. 437-228.000.
Robertson, James B., to United States of America as represented by the United States National Aeronautics and Space Administration, The. Enhanced single layer multi-color luminescent display with coactivators. 4,987,339, Cl. 313-502.000.
Robertson, Jeffrey C., to Eastman Kodak Company. Optical-mechanical rotation sensing mechanism for a web-roll. 4,987,300, Cl. 250-231.140.
Robinson, Danny C., to Leggett & Platt, Incorporated. Double-lock sofa sleeper mechanism. 4,985,945, Cl. 5-13.000.
Robinson Hartman: *See*—
Robinson, Robert; and Hartman, Ernest O., 4,986,217, Cl. 119-168.000.
Robinson, Madison K., to Bell Helicopter Textron, Inc. Pitch change bearing system. 4,986,735, Cl. 416-134.00A.
Robinson, Robert; and Hartman, Ernest O., to Robinson Hartman. Disposable cat litter box. 4,986,217, Cl. 119-168.000.
Robotech Laboratory Co., Ltd.: *See*—
Okamoto, Hironobu; Izumi, Tetsujirou; Kishi, Hiroo; and Okamoto, Naoki, 4,986,384, Cl. 180-167.000.
Rochester Gauges, Inc.: *See*—
Fekete, Nicholas M. G., 4,987,400, Cl. 338-164.000.
Rockefeller University, The: *See*—
Kreek, Mary J.; and Fishman, Jack, 4,987,136, Cl. 514-282.000.
Rockwell Automotive Body Components (UK) Ltd.: *See*—
Fisher, Sidney E., 4,986,098, Cl. 70-262.000.
Rockwell-CIM: *See*—
Bertolini, Carlo; and Becerril, Philippe, 4,986,030, Cl. 49-351.000.
Rockwell International Corporation: *See*—
Bishop, Gary D.; Campbell, Melvin L.; and Shaw, James E., 4,987,289, Cl. 219-209.000.
Stromath, David K.; and Wiler, Curtiss D., 4,986,495, Cl. 244-117.00A.
Vick, Gerald L., 4,986,661, Cl. 356-350.000.
Rode, Klaus; Mohr, Dieter; Frass, Werner; and Gersdorf, Joachim, to Hoechst Aktiengesellschaft. Photopolymerizable composition comprising (meth)acrylates with photooxidizable groups, and a recording material produced therefrom. 4,987,055, Cl. 430-277.000.
Roger, Gregory J. Method and apparatus for removing prosthetic cement. 4,986,826, Cl. 606-82.000.
Rogers Corporation: *See*—
Miller, Terry L.; Zdanis, William R., Jr.; Woerner, Graham A.; and Horn, Allen F., III, 4,987,274, Cl. 174-102.00R.
Rogers, David M.: *See*—
Longcor, Steven W.; Chang, Kuang-Yeh; Lien, Jih-Chang; and Rogers, David M., 4,987,465, Cl. 357-23.130.
Rogers, Randy: *See*—
Greenberg, Ronald; Rogers, Randy; Bernier, Roland; and Littman, Stanley, 4,987,024, Cl. 428-219.000.
Roggero, Arnaldo: *See*—
Cesari, Marco; Roggero, Arnaldo; Rivola, Luigi; and Demertzis, Yean, 4,986,962, Cl. 422-7.000.
Rogora, Edoardo: *See*—
Gerosa, Alessandro; Rogora, Edoardo; Villa, Ezio; and Susa, Andrea, 4,987,404, Cl. 340-461.000.
Rohde, Ralph; Biere, Helmut; Schmiechen, Ralph; Andrews, John S.; and Stephens, David N., to Schering Aktiengesellschaft. N-hetaryl imidazole derivatives. 4,987,146, Cl. 514-397.000.
Rohrscheid, Freimund, to Hoechst Aktiengesellschaft. Process for the preparation of high-purity 5,5'-[2,2,2-trifluoro-1-(trifluoromethyl)-ethylidene]bis-1,3-isobenzofurandione. 4,987,238, Cl. 549-241.000.
Roland, Charles M.: *See*—
Oberster, Arthur E.; Roland, Charles M.; and Bohm, Georg G. A., 4,987,192, Cl. 525-274.000.
Rolls-Royce: *See*—
Gartland, Frederick H., 4,986,333, Cl. 164-30.000.
Rolls-Royce plc: *See*—
Ford, David A.; Higginbotham, Gordon J. S.; Pugh, David R.; and Kumar, Naresh, 4,986,517, Cl. 266-234.000.
Roman, Gianfranco, to Claber S.p.A. Spray gun with adjustment of the shape of the jet. 4,986,477, Cl. 239-455.000.
Romer, Andrew E., to Rosemount Limited. Optical sensor with plual detectors and pulse sandwiching. 4,987,294, Cl. 250-208.100.
Romer, Michael: *See*—
Eidenschink, Rudolf; Haas, Gunther; Pohl, Ludwig; Romer, Michael; Scheuble, Bernhard; and Weber, Georg, 4,986,931, Cl. 252-299.630.
Romicon Inc.: *See*—
Breslau, Barry R.; and Slegers, John, 4,986,918, Cl. 210-652.000.
Rooseboom, Albert: *See*—
Salberg, David B.; and Rooseboom, Albert, 4,986,693, Cl. 404-4.000.
Roosen, Raymond A.; De Meyer, Marcellus H.; and Janssens, Wilhelmus, to Agfa-Gevaert, N.V. Method for the production of a multicolor filter array. 4,987,043, Cl. 430-7.000.
Rose, Klaus: *See*—
Gersdorf, Joachim; and Rose, Klaus, 4,987,053, Cl. 430-277.000.
Rosemount Limited: *See*—
Romer, Andrew E., 4,987,294, Cl. 250-208.100.
Rosengren, Brian P.: *See*—
Preves, David A.; Rosengren, Brian P.; Holte, James E.; and Leonard, Myer S., 4,986,281, Cl. 128-782.000.
Ross, Paul F., II, to Control Devices, Inc. Valve. 4,986,297, Cl. 137-15.000.
Rossum, David P., to E-Mu Systems, Inc. Digital sampling instrument. 4,987,600, Cl. 381-118.000.
Rostra Tool Company: *See*—
Steiner, Richard A., 4,985,996, Cl. 30-90.100.
Roth, Brian A.: *See*—
Lueders, Edgar D.; and Roth, Brian A., 4,986,358, Cl. 166-321.000.
Roth, Nora. Skin moisturizing and oil restoring lotion. 4,986,986, Cl. 424-195.100.
Rothmann, Werner; and Meckelburg, Hans J., to Rheinisch-Westfalischer Technischer Uberwachungs-Verein e.V. Test apparatus for motor vehicles, especially brake test stand for vehicles with antiskid brake systems. 4,986,114, Cl. 73-117.000.

Rots, Johannes A. M., to U.S. Philips Corp. Electronic component, electrolytic capacitor and metal housing. 4,987,520, Cl. 361-521.000.
Rotter, Franz; Nayer, Wolfgang; Quantschnigg, Heribert; and Sattler, Erich, to Voest-Alpine Maschinenbau Gesellschaft m.b.H. Device for determining the condition of railway switches or railway crossings. 4,986,498, Cl. 246-458.000.
Rouch, Stephen F., to Delco Electronics Corporation. Second opinion method of pattern recognition error reduction. 4,987,604, Cl. 382-8.000.
Roussel Uclaf: *See—*
Clemence, Francois; Le Martret, Odile; and Delevallee, Francois, 4,987,131, Cl. 514-220.000.
Clemence, Francois; Le Martret, Odile; and Delevallee, Francoise, 4,987,140, Cl. 514-335.000.
Kay, David P.; and Kennewell, Peter D., 4,987,153, Cl. 514-620.000.
Nedelec, Lucien; Nique, Francois; and Moura, Anne-Marie, 4,987,128, Cl. 514-175.000.
Rowell, David M.: *See—*
Abkowitz, Stanley; Rowell, David M.; Heussi, Harold L.; Ludwig, Harold P.; and Kraus, Stephen A., 4,987,033, Cl. 428-469.000.
Rowley, William R. C.; and Gill, Patrick, to United Kingdom of Great Britain and Northern Ireland, The Secretary of State for Trade and Industry in Her Britannic Majesty's Government of the. Helium-neon lasers. 4,987,574, Cl. 372-28.000.
Rubin, Mae K.: *See—*
Keville, Kathleen M.; Le, Quang N.; Mo, Wang-Tsee T.; and Rubin, Mae K., 4,986,894, Cl. 208-27.000.
Ruckenbauer, Friedrich; and Winkler, Josef, to AVL Gesellschaft fur Verbrennungskraftmaschinen und Messtechnik m.b.H. Prof.Dr.Dr.H.c. Hans List. Pressure sensor. 4,986,129, Cl. 73-756.000.
Ruddy, Kenneth E.: *See—*
Mueller, Mark D.; Jones, Frank; Quintana, Julio; Ruddy, Kenneth E.; and Mims, Michael, 4,986,361, Cl. 166-381.000.
Ruhrkohle AG: *See—*
Wessiepe, Klaus; and Stewen, Wilhelm, 4,986,032, Cl. 49-477.000.
Rule, Dennis A.: *See—*
Knight, Dereck I.; and Rule, Dennis A., 4,986,206, Cl. 114-183.00R.
Ruof, Edgar J.: *See—*
Beck, Arnold A.; Ruof, Edgar J.; Nedelk, John; Hurley, Ralph J.; and Smithberger, Steven R., 4,986,610, Cl. 303-93.000.
Ruoff, Manfred: *See—*
Kessler de Vivie, Achill; Linder, Ernst; Rembold, Helmut; Ruoff, Manfred; and Teegen, Walter, 4,986,246, Cl. 123-520.000.
Rupp, Lothar: *See—*
Wunderling, Martin; and Rupp, Lothar, 4,987,195, Cl. 525-329.400.
Ruso, Saverio; Alfonso, Giovanni C.; Pedemonte, Enrico; Turturro, Antonio; and Martuscelli, Ezio, to Consiglio Nazionale Delle Ricerche. Polycaprolactam-based polymer compositions. 4,987,189, Cl. 525-183.000.
Ryan, Kevin M. Concealable vehicular radio communications antenna system. 4,987,422, Cl. 343-713.000.
Rydell, Mark A.: *See—*
Owens, Robert C.; and Rydell, Mark A., 4,986,830, Cl. 606-194.000.
Ryobi Ltd.: *See—*
Ishii, Koji; and Ikeda, Naoki, 4,986,176, Cl. 101-148.000.
Yamauchi, Noriyoshi; Ishida, Hitoshi; Kawai, Kazuaki; and Mizukusa, Yasuyuki, 4,986,338, Cl. 164-457.000.
Ryu, Ushio; Ono, Hideo; Kabashima, Kengi; Masushige, Yutaka; Matsuo, Teruhiko; and Koyanagi, Tadashi, to Asahi Kasei Kogyo Kabushiki Kaisha. Winder of synthetic yarn, cheese-like yarn package of synthetic yarn, and method for winding the same. 4,986,483, Cl. 242-45.000.
S&C Electric Company: *See—*
Hall, Walter J., 4,986,578, Cl. 292-104.000.
Sackner, Marvin A. Method and apparatus for non-invasive monitoring of central venous pressure. 4,986,277, Cl. 128-672.000.
Saga, Hiroshi: *See—*
Ohata, Hiroyuki; Tanaka, Masaki; Ohashi, Hiroshi; Suemoto, Kiyoji; Iida, Hidekazu; and Saga, Hiroshi, 4,987,180, Cl. 524-860.000.
Saho, Norihide; Nemoto, Takeo; and Shizuoka, Yoshihide, to Hitachi, Ltd. Cryostat with cryo-cooler. 4,986,077, Cl. 62-51.100.
Saho, Takahiro; Akutsu, Yoshinori; Nakano, Takaharu; and Ohtake, Nobumasa, to Chisso Corporation. Polyorganosiloxane compounds with epoxy group. 4,987,203, Cl. 528-27.000.
St. Leger, Raymond J.: *See—*
Charnley, Anthony K.; Cooper, Richard M.; and St. Leger, Raymond J., 4,987,077, Cl. 435-223.000.
Saito, Atsushi: *See—*
Imahashi, Satoshi; Saito, Atsushi; and Yamashita, Katuhiro, 4,987,056, Cl. 430-281.000.
Saito, Haruo: *See—*
Tedder, Thomas F.; Schlossman, Stuart F.; and Saito, Haruo, 4,987,084, Cl. 436-63.000.
Saito, Isoo; Sato, Takuji; Kubota, Koichi; and Yamamoto, Masaharu, to Toray Industries, Inc. High-tenacity conjugated fiber and process for preparation thereof. 4,987,030, Cl. 428-373.000.
Saito, Jun: *See—*
Shido, Hironori; Saito, Jun; Hiroi, Masakazu; Kobayashi, Kenji; Murakami, Koichi; Naito, Masataka; and Honjo, Takeshi, 4,986,520, Cl. 270-53.000.
Saito, Keiji; Ichimura, Katsuhiko; and Tajima, Takahiro, to Shimadzu Corporation. Analyzer of partial molecular structures. 4,987,548, Cl. 364-498.000.
Saito, Masaharu: *See—*
Kobayashi, Toshiro; Hirasishi, Hisashi; Hineno, Makoto; Kawata, Tomoshi; Kohara, Yuuji; and Saito, Masaharu, 4,986,181, Cl. 101-348.000.
Saito, Satoshi, to Kabushiki Kaisha Toshiba. Measuring endoscope. 4,986,262, Cl. 128-6.000.
Saito, Shinkichi: *See—*
Teramoto, Mitsutake; Saito, Shinkichi; Okumoto, Takaharu; and Asabuki, Hideyo, 4,986,541, Cl. 273-77.00A.
Saito, Takayuki: *See—*
Kobayashi, Akihiro; Fujita, Toshiyuki; Saito, Takayuki; Kawai, Hiromasa; Hosoi, Yutaka; and Shibata, Hideaki, 4,986,648, Cl. 351-160.00R.
Saito, Tsutomu: *See—*
Matsushima, Tadashi; and Saito, Tsutomu, 4,986,159, Cl. 84-660.000.
Saitoh, Kimio, to Mitsubishi Denki Kabushiki Kaisha. Numerical control device. 4,987,359, Cl. 318-625.000.
Saitoh, Yasuo, to NEC Corporation. Microwave integrated circuit having a level shift circuit. 4,987,382, Cl. 330-277.000.
Saitou, Mitsuo; Ukai, Toshinao; and Ikeda, Tadashi, to Fuji Photo Film Co., Ltd. Silver halide photographic materials. 4,987,064, Cl. 430-570.000.
Sakabe, Yukio: *See—*
Takagi, Hiroshi; Mori, Yoshiaki; Tani, Hiroji; and Sakabe, Yukio, 4,987,108, Cl. 501-138.000.
Sakaguchi, Akio: *See—*
Sato, Hozumi; Shimada, Humito; Sakaguchi, Akio; Takemura, Yasuhiko; Nishi, Tadaaki; Ono, Hisao; Nagano, Masanobu; and Miyachi, Takumi, 4,987,017, Cl. 428-36.800.
Sakaguchi, Michiaki: *See—*
Narumi, Kazuhito; Takeuchi, Fumio; and Sakaguchi, Michiaki, 4,987,107, Cl. 501-137.000.
Sakaguchi, Ryoichi: *See—*
Takatsuki, Toyohiko; Yoshida, Masahiro; Sugimoto, Konomu; and Sakaguchi, Ryoichi, 4,986,452, Cl. 222-209.000.
Sakaguchi, Yoshio: *See—*
Tozune, Sigeru; Yamazaki, Shizuo; Komori, Ryuichi; Ishii, Masashi; Sakaguchi, Yoshio; and Oda, Tetsuya, 4,987,156, Cl. 521-99.000.
Sakai, Hitoshi: *See—*
Hikosaka, Akihiro; Sakai, Hitoshi; Yoshihara, Takayoshi; and Asakura, Naoichi, 4,987,451, Cl. 355-245.000.
Sakai, Mitsugu: *See—*
Omura, Yasuhiro; Sakai, Mitsugu; Karaki, Koichi; and Sasaki, Yasuo, 4,986,125, Cl. 73-606.000.
Sakai, Takao: *See—*
Yamanishi, Akio; Kamezawa, Hitoshi; Sakai, Takao; Tsuji, Sadafusa; and Ota, Mitsunobu, 4,986,665, Cl. 356-402.000.
Sakamoto, Hidasato, to Furnace Juko Kabushiki Kaisha. Furnace. 4,986,750, Cl. 432-131.000.
Sakamoto, Masakatu; Yaguchi, Youichi; Toshima, Hiroaki; and Kotaki, Toshiroh, to Kabushiki Kaisha Kenwood; and Namiki Precision Jewel Co., Ltd. Process for forming a crystalline diamond film. 4,987,002, Cl. 427-34.000.
Sakashita, Seiji: *See—*
Ozeki, Hiroaki; Sakashita, Seiji; and Kanno, Ippei, 4,987,606, Cl. 455-188.000.
Sakazume, Suehiro: *See—*
Orikasa, Yuichi; and Sakazume, Suehiro, 4,987,165, Cl. 523-435.000.
Sakurai, Kenya: *See—*
Nishiura, Masaharu; and Sakurai, Kenya, 4,987,098, Cl. 437-142.000.
Sakurai, Yoshiaki: *See—*
Homma, Noriyuki; Higuchi, Hisayuki; Idei, Yoji; Nambu, Hiroaki; and Sakurai, Yoshiaki, 4,986,666, Cl. 365-230.080.
Sakuta, Koji: *See—*
Kuwata, Satoshi; Sakuta, Koji; and Mori, Shigeru, 4,987,169, Cl. 524-267.000.
Sala International AB: *See—*
Falk, Thomas S. A., 4,986,008, Cl. 34-15.000.
Salberg Concrete Products (Proprietary) Ltd.: *See—*
Salberg, David B.; and Rooseboom, Albert, 4,986,693, Cl. 404-4.000.
Salberg, David B.; and Rooseboom, Albert, to Salberg Concrete Products (Proprietary) Ltd. Roadway water drainage installation. 4,986,693, Cl. 404-4.000.
Saldenais, Arvids: *See—*
Burgess, Dennis A.; Campbell, William J.; and Saldenais, Arvids, 4,987,445, Cl. 355-84.000.
Salkeld, Geoffrey, to British Aerospace Public Limited Company. Stabilizing air to ground radar. 4,987,419, Cl. 342-75.000.
Salmon, John K., to Otis Elevator Company. Elevator load weighing. 4,986,391, Cl. 187-1.00R.
Saltzman, Robert S.: *See—*
Apple, Glenn D.; Saltzman, Robert S.; and Sennet, Stewart W., 4,987,083, Cl. 436-55.000.
Sammons, Marvin L. Curve cutting method and apparatus. 4,986,152, Cl. 83-13.000.
Samson, Jeffrey T.: *See—*
Steiner, Eric L.; Weiss, Mark E.; and Samson, Jeffrey T., 4,986,816, Cl. 604-192.000.
Samsung Electron Devices Co., Ltd.: *See—*
Jongin, Jung, 4,986,788, Cl. 445-50.000.
SamSung Electronics Co., Ltd.: *See—*
Seo, Seong-Mo, 4,987,325, Cl. 307-465.000.

Sanden Corporation: *See*—
Kanbe, Toru; Taguchi, Masayuki; and Sato, Katsunobu, 4,986,441, Cl. 221-130.000.
Takahashi, Yutaka; Harashima, Ikuo; Nakayama, Shunichi; Arai, Yasuyuki; Takayanagi, Yasushi; Sekiguchi, Ryoichi; Abe, Tomomitsu; and Hayakawa, Hiroshi, 4,986,448, Cl. 222-129.100.
Tomaru, Keiichi, 4,986,082, Cl. 62-149.000.
Sandkuhler, Georg: *See*—
Hahmann, Wolfgang; Kirchhoff, Johannes; and Sandkuhler, Georg, 4,986,074, Cl. 60-468.000.
Sandler, Stanley R., to Atochem North America, Inc. 2,4-pentanedione-1,5-disulfonic acid and method for preparing the same. 4,987,249, Cl. 562-102.000.
Sandusky, Randall L.: *See*—
Leaper, Mark W. E.; Noguchi, Robert Y.; and Sandusky, Randall L., 4,987,355, Cl. 318-561.000.
Sankei Pharmaceutical Co., Ltd.: *See*—
Shimizu, Shigeo; and Takano, Hiroyuki, 4,987,129, Cl. 514-206.000.
Sano, Akira: *See*—
Ishii, Toshitsuga; Imai, Isao; Sano, Akira; and Sueyoshi, Kouichi, 4,986,972, Cl. 423-344.000.
Sano, Ichiro: *See*—
Takahashi, Katsuhiro; Yonezu, Kazuyoshi; Yasuda, Hiroshi; Sano, Ichiro; and Kimura, Toshiaki, 4,986,317, Cl. 141-1.100.
Sano, Masafumi: *See*—
Takasu, Katsuji; Sano, Masafumi; Tsuda, Hisanori; and Hirai, Yutaka, 4,987,460, Cl. 357-17.000.
Sanshin Kogyo Kabushihi Kaisha: *See*—
Sougawa, Masafumi, 4,986,780, Cl. 440-89.000.
Sanshin Kogyo Kabushiki Kaisha: *See*—
Imaeda, Hirofumi, 4,987,353, Cl. 318-293.000.
Oishi, Hiroshi, 4,986,239, Cl. 123-413.000.
Santos, A. John; and Brauer, Michael C., to Torrington Company, The. High resolution encoder. 4,987,415, Cl. 341-15.000.
Sanyo Electric Co., Ltd.: *See*—
Ishikawa, Tsutomu, 4,987,380, Cl. 330-254.000.
Kaite, Osamu; Yuchi, Takahiro; and Murashima, Hirotsugu, 4,987,491, Cl. 358-166.000.
Sapporo Breweries Limited: *See*—
Takashio, Masachika; Chikano, Takahide; and Kamimura, Minoru, 4,987,076, Cl. 435-191.000.
Sarantola, Jaakko: *See*—
Taipale, Jyrki; and Sarantola, Jaakko, 4,986,883, Cl. 162-205.000.
Sardjono, Wyatmodjo: *See*—
Meyer, Dolph A.; and Sardjono, Wyatmodjo, 4,986,051, Cl. 52-738.000.
Sarh, Branko. Convertible fixed wing aircraft. 4,986,493, Cl. 244-2.000.
Sarrine, Robert J.; Garsee, Henry A.; Kelley, Charles D.; and Guadagno, Philip A., to Helena Laboratories Corporation. Automatic electrophoresis apparatus and method. 4,986,891, Cl. 204-299.00R.
Sartomer Company, Inc.: *See*—
Costin, C. Richard; and Bailey, Michael A., 4,986,940, Cl. 264-3.100.
Sasaki, Hitoshi: *See*—
Kobayashi, Yukio; Sasaki, Hitoshi; Matsuo, Norishige; and Ohba, Mitsuru, 4,986,995, Cl. 426-412.000.
Sasaki, Shuichi: *See*—
Suzuki, Shin; Sasaki, Shuichi; and Suzuki, Masao, 4,986,229, Cl. 123-179.00G.
Sasaki, Yasuo: *See*—
Omura, Yasuhiro; Sakai, Mitsugu; Karaki, Koichi; and Sasaki, Yasuo, 4,986,125, Cl. 73-606.000.
Sasano, Akiyoshi: *See*—
Hyodo, Toru; and Sasano, Akiyoshi, 4,986,201, Cl. 112-456.000.
Sase, Akira: *See*—
Shimada, Satoshi; Ugai, Seiichi; Sase, Akira; and Shimizu, Yasushi, 4,986,127, Cl. 73-714.000.
Satake, Akemi: *See*—
Suzuki, Kunio; Fukada, Takeshi; Kinka, Mikio; Abe, Masayoshi; Shibata, Katsuhiko; Susukida, Masato; Ishida, Noriya; Satake, Akemi; and Arai, Yasuyuki, 4,987,005, Cl. 427-39.000.
Sato, Atsushi: *See*—
Tamura, Kazuhiko; Sato, Atsushi; Aizawa, Yutaka; and Suzuki, Yoshiyuki, 4,987,424, Cl. 343-795.000.
Sato, Fumie, to Nissan Chemical Industries, Ltd. Optically active alcohols and process for producing the same. 4,987,236, Cl. 549-208.000.
Sato, Goro; Komatsu, Michio; Nishida, Hiroyasu; Tanaka, Yoshichika; Koyanagi, Tsuguo; and Mihara, Kei-ichi, to Catalysts & Chemicals Industries Co., Ltd. Process for preparing mono-dispersed particles. 4,987,012, Cl. 427-221.000.
Sato, Hiroshi; Utsui, Yoshihiko; Ikeda, Hideo; and Hamamura, Chiyo, to Mitsubishi Denki Kabushiki Kaisha. Strain detector with magnetostrictive elements. 4,986,137, Cl. 73-862.360.
Sato, Hiroshi: *See*—
Sirosita, Masao; Mizutani, Masato; Kimura, Shigeko; Oguri, Yukio; Kitamura, Masaru; Umada, Youichi; and Sato, Hiroshi, 4,986,989, Cl. 424-635.000.
Sato, Hozumi; Shimada, Humito; Sakaguchi, Akio; Takemura, Yasuhiko; Nishi, Tadaaki; Ono, Hisao; Nagano, Masanobu; and Miyachi, Takumi, to Japan Synthetic Rubber Co., Ltd. Thermoplastic elastomer composition and Freon gas hose made thereof. 4,987,017, Cl. 428-36.800.
Sato, Itsuko; Naito, Katsuyuki; Genma, Nobuhiro; and Azuma, Makoto, to Kabushiki Kaisha Toshiba. Organic thin-film device. 4,987,023, Cl. 428-215.000.
Sato, Katsunobu: *See*—
Kanbe, Toru; Taguchi, Masayuki; and Sato, Katsunobu, 4,986,441, Cl. 221-130.000.
Sato, Kazuhiko: *See*—
Yoshizu, Fumitsugu; and Sato, Kazuhiko, 4,986,117, Cl. 73-119.00A.
Sato, Makoto: *See*—
Ohto, Takashi; Tanaka, Takashi; and Sato, Makoto, 4,987,016, Cl. 428-34.100.
Sato, Masahiko: *See*—
Yamazaki, Shunpei; and Sato, Masahiko, 4,986,638, Cl. 350-341.000.
Sato, Mitsuru: *See*—
Uchiyama, Futoshi; Agatsuma, Ko; Ohara, Takeshi; Tsukamoto, Koichi; Ishigami, Sumiyuki; Sato, Mitsuru; and Sugimoto, Hisashi, 4,986,670, Cl. 374-117.000.
Sato, Naoki: *See*—
Gohbara, Masatoshi; Asano, Tamotsu; Ozawa, Shuji; Yamazaki, Hideo; Ishii, Tsutomu; Nishida, Makoto; Watanabe, Junko; and Sato, Naoki, 4,986,846, Cl. 71-92.000.
Sato, Osamu: *See*—
Soshi, Isao; Sato, Osamu; and Naruo, Teruhiko, 4,987,434, Cl. 354-106.000.
Sato, Takuji: *See*—
Saito, Isoo; Sato, Takuji; Kubota, Koichi; and Yamamoto, Masaharu, 4,987,030, Cl. 428-373.000.
Satoh, Isao: *See*—
Fukushima, Yoshihisa; Satoh, Isao; Ichinose, Makoto; Kuroki, Yuzuru; and Takagi, Yuuji, 4,986,668, Cl. 369-59.000.
Satoh, Yasuo; and Kobayashi, Tohru, to Hitachi, Ltd. Semiconductor integrated circuit device having an improved common wiring arrangement. 4,987,326, Cl. 307-465.000.
Satou, Tadaji: *See*—
Tomisawa, Yoshiaki; Satou, Tadaji; Hayashi, Nobuyuki; and Miyamae, Yusuke, 4,986,869, Cl. 156-250.000.
Sattler, Erich: *See*—
Rotter, Franz; Nayer, Wolfgang; Quantschnigg, Heribert; and Sattler, Erich, 4,986,498, Cl. 246-458.000.
Saur, Wolfgang; Tonolla, Robert; Taschke, Franz; and Staemmele, Siegfried, to Gurit-Essex AG. Method of discharging a substance from a cartridge and an apparatus for carrying out the method. 4,986,443, Cl. 222-1.000.
Saur, Wolfgang: *See*—
Braendle, Jurg G.; and Saur, Wolfgang, 4,986,867, Cl. 156-244.110.
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Semrad, Neal. Toggle catheter. 4,986,810, Cl. 604-106.000.
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Pigneri, Anthony M., 4,987,272, Cl. 568-640.000.
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Shelley, Edwin F. Apparatus and method for selectively delaying the connection of an electrical supply voltage to an electrical load. 4,987,513, Cl. 361-92.000.
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Shibata, Yoshihiko. Apparatus for degassing a liquid. 4,986,837, Cl. 55-190.000.
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Shimazu, Hisanari: *See*—
Takase, Tsugiko; Adachi, Hideo; Okada, Takao; Shimazu, Hisanari; and Tomabechi, Hideo, 4,987,303, Cl. 250-306.000.
Shimizu, Akira: *See*—
Yamamoto, Tadashi; Takai, Kazumitsu; and Shimizu, Akira, 4,987,332, Cl. 310-309.000.
Shimizu, Shigeo; and Takano, Hiroyuki, to Sankei Pharmaceutical Co., Ltd.; and Nippon Pharmaceutical Development Institute Co., Ltd. Cephalosporin derivatives. 4,987,129, Cl. 514-206.000.
Shimizu, Tasuku: *See*—
Ishikawa, Yuichi; Yoshimura, Toshihiko; Shimizu, Tasuku; Otaka, Masahiro; and Takaku, Kazuo, 4,987,367, Cl. 324-227.000.

Shimizu, Yasushi: *See—*
Shimada, Satoshi; Ugai, Seiichi; Sase, Akira; and Shimizu, Yasushi, 4,986,127, Cl. 73-714.000.
Shimoie, Shizuo, to Kubota, Ltd. Hydraulic circuit for backhoe. 4,986,075, Cl. 60-468.000.
Shimonosono, Hitoshi: *See—*
Uemura, Masakazu; Hirano, Yoshinori; and Shimonosono, Hitoshi, 4,986,345, Cl. 165-86.000.
Shimozono, Hiroaki: *See—*
Yokokura, Takashi; Hori, Nobuo; Shimozono, Hiroaki; and Niimura, Satoru, 4,986,653, Cl. 356-5.000.
Shin-Etsu Chemical Co., Ltd.: *See—*
Inoue, Yoshio; Arai, Masatoshi; and Kimura, Tsuneo, 4,987,155, Cl. 521-77.000.
Kuwata, Satoshi; Sakuta, Koji; and Mori, Shigeru, 4,987,169, Cl. 524-267.000.
Ohata, Hiroyuki; Tanaka, Masaki; Ohashi, Hiroshi; Suemoto, Kiyoji; Iida, Hidekazu; and Saga, Hiroshi, 4,987,180, Cl. 524-860.000.
Takaoka, Akio; Koike, Noriyuki; and Fujii, Hideki, 4,987,267, Cl. 568-615.000.
Shin-Etsu Handotai Co. Ltd.: *See—*
Endo, Masahisa; Noto, Nobuhiko; and Takahashi, Toshiharu, 4,987,472, Cl. 357-60.000.
Shinada, Sigeo; Fujita, Hiroyuki; and Nagata, Yoichi, to Hitachi, Ltd. Monitor system for multiplex equipment. 4,987,568, Cl. 370-15.000.
Shinn, Ronald R.: *See—*
Lowder, James E.; Shinn, Ronald R.; and Baker, John L., 4,986,721, Cl. 414-685.000.
Shinohara, Isao: *See—*
Noguchi, Naoto; and Shinohara, Isao, 4,987,333, Cl. 310-268.000.
Shinomiya, Tsutomu, to Hokkai Can Co., Ltd. Sheet handling apparatus. 4,986,731, Cl. 414-798.900.
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Shinozawa, Shinji: *See—*
Yagi, Nagatada; Shiraishi, Motoatsu; Kimura, Shizuo; Watano, Yukihisa; Nakamura, Mitsuki; and Shinozawa, Shinji, 4,985,993, Cl. 29-894.353.
Shiozawa, Hideo: *See—*
Ishikawa, Masayuki; Okuda, Hajime; Shiozawa, Hideo; Itaya, Kazuhiko; Watanabe, Yukio; Suzuki, Mariko; and Hatakoshi, Genichi, 4,987,096, Cl. 437-129.000.
Shirabe, Naotaka: *See—*
Kushibe, Takahiro; Takano, Yuichi; Tateno, Manabu; Ohno, Eishi; and Shirabe, Naotaka, 4,986,247, Cl. 123-533.000.
Shirai, Kenichi: *See—*
Suzuki, Toshihiko; and Shirai, Kenichi, 4,986,324, Cl. 152-209.00R.
Shirai, Kenji: *See—*
Nishii, Michiharu; Mizuno, Genji; Nomura, Yoshihisa; Kato, Masahiko; Shirai, Kenji; and Tanoue, Junichi, 4,986,613, Cl. 303-114.000.
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Yagi, Nagatada; Shiraishi, Motoatsu; Kimura, Shizuo; Watano, Yukihisa; Nakamura, Mitsuki; and Shinozawa, Shinji, 4,985,993, Cl. 29-894.353.
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Fukasawa, Junichi; Shirakawa, Noriko; and Tsutsumi, Hisao, 4,987,241, Cl. 556-174.000.
Shiraki, Takeshi; and Nakashima, Koji, to Mitsui Petrochemical Industries, Ltd. Inflation film of ultrahigh molecular weight polyethylene. 4,987,025, Cl. 428-220.000.
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Yui, Yasuji; and Shirakura, Akira, 4,987,047, Cl. 430-138.000.
Shirey, Benjamin G.: *See—*
Weissler, Harold E., II; and Shirey, Benjamin G., 4,986,243, Cl. 123-488.000.
Shizuoka, Yoshihide: *See—*
Saho, Norihide; Nemoto, Takeo; and Shizuoka, Yoshihide, 4,986,077, Cl. 62-51.100.
Shoei Chemical Inc.: *See—*
Asada, Eiichi; Yamazoe, Mikio; and Matsumura, Shigeru, 4,986,933, Cl. 252-518.000.
Shreeve, Robert W.; and Atwood, B. Dale, to Hewlett-Packard Company. Method and apparatus for testing integrated circuits. 4,987,365, Cl. 324-158.00F.
Shukla, Yagya: *See—*
Ramachandran, Ramakrishnan; Shukla, Yagya; and MacLean, Donald L., 4,987,239, Cl. 549-250.000.
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Sidam S.R.L.: *See—*
Grigoli, Franco; and Trabacchi, Franco, 4,986,080, Cl. 62-75.000.
Sidey, Roger C. H., to British Petroleum Company p.l.c., The. Noncontacting gauge for surfaces. 4,986,111, Cl. 73-37.500.
Siegenia-Frank KG: *See—*
Schneider, Alfred; and Zimmerman, Michael, 4,986,028, Cl. 49-248.000.
Sting, Benno; and Hartmann, Gerhard, 4,986,582, Cl. 292-336.300.
Siemens Aktiengesellschaft: *See—*
Bertini, Paolo, 4,986,478, Cl. 239-585.000.
Haertl, Christof, 4,987,597, Cl. 381-69.000.
Hamel, Manfred, 4,987,366, Cl. 324-207.260.
Heinen, Jochen, 4,987,576, Cl. 372-46.000.
Held, Kurt, 4,987,397, Cl. 335-131.000.
Hosten, Daniel; and Floegel, Lothar, 4,986,888, Cl. 204-198.000.
Mauthe, Manfred, 4,987,383, Cl. 330-279.000.
Schewe, Herbert; and Stephani, Dietrich, 4,987,510, Cl. 360-126.000.
Schmidt, Helmut; Grecksch, Ernst; and Eisenmann, Manfred, 4,987,329, Cl. 310-156.000.
Seunik, Horst; Krueger, Hans; and Weber, Hubert, 4,987,577, Cl. 372-82.000.
Voss, Peter, 4,987,087, Cl. 437-6.000.
Zwanziger, Peter, 4,987,362, Cl. 323-289.000.
Siemens Automotive L.P.: *See—*
Weissler, Harold E., II; and Shirey, Benjamin G., 4,986,243, Cl. 123-488.000.
Siemens-Bendix Automotive Electronics: *See—*
Pournain, Michel A.; Loncle, Jean-Pierre A.; and Colombie, Francis J., 4,987,317, Cl. 307-40.000.
SIG Schweizerische Industrie-Gesellschaft: *See—*
Harsy, Gabor, 4,986,190, Cl. 105-4.400.
Signorini, Alberto. Disposable nurser. 4,986,428, Cl. 215-11.300.
Sillars, Nan C.: *See—*
Bushell, Michael J.; Carr, Robin A. E.; Moseley, Donn W.; and Sillars, Nan C., 4,987,141, Cl. 514-346.000.
Sillett, Roderick J.: *See—*
Haymond, William D.; Sillett, Roderick J.; and Lukas, Robert M., 4,987,571, Cl. 370-85.000.
Sillion, Bernard: *See—*
Malinge, Jean; Rabilloud, Guy; and Sillion, Bernard, 4,987,218, Cl. 528-353.000.
Simmons, Randy G.: *See—*
Ferrill, Jess B.; and Simmons, Randy G., 4,986,779, Cl. 439-108.000.
Simmons U.S.A. Corporation: *See—*
Stumpf, Walter, 4,986,518, Cl. 267-91.000.
Simon, Georg N.: *See—*
Goerrissen, Heiner; Heinz, Gerhard; Hilt, Albrecht; and Simon, Georg N., 4,987,176, Cl. 524-456.000.
Simon, Gerhard, to Varta Batterie Aktiengesellschaft. Sealed nickel-cadmium battery. 4,987,041, Cl. 429-59.000.
Simon, Ira J.: *See—*
Campbell, Andrew B.; and Simon, Ira J., 4,986,583, Cl. 292-336.300.
Simon, Peter, to KNURR-Mechanik fur die Elektronik Aktiengesellschaft. Equipment carrier. 4,986,501, Cl. 248-122.000.
Simonelli, Francesco: *See—*
Cecchi, Stefano; and Simonelli, Francesco, 4,986,663, Cl. 356-375.000.
Simonet, Guy: *See—*
Dupont, Rene ; and Simonet, Guy, 4,986,978, Cl. 423-648.100.
Simpson, Stephen M.: *See—*
Woodward, Antony I.; and Simpson, Stephen M., 4,987,014, Cl. 427-278.000.
Sinanian, Robert: *See—*
Alexander, James; and Sinanian, Robert, 4,986,409, Cl. 198-418.400.
Sinay, Pierre: *See—*
Choay, Jean; Jacquinet, Jean-Claude; Petitou, Maurice; and Sinay, Pierre, 4,987,223, Cl. 536-17.700.
Sing, Peter. Thermal insulating shade. 4,986,343, Cl. 165-41.000.
Singleton, Robert, Jr. Color indicating tamper-proof seal. 4,986,429, Cl. 215-230.000.
Sirany, Dal. Method of treating a virus outbreak. 4,987,127, Cl. 514-159.000.
Sirosita, Masao; Mizutani, Masato; Kimura, Shigeko; Oguri, Yukio; Kitamura, Masaru; Umada, Youichi; and Sato, Hiroshi, to Sumitomo Chemical Company, Limited. Zeolite fungicide. 4,986,989, Cl. 424-635.000.
Sisk, William P.: *See—*
Berman, Michael L.; Meissner, P. Scott; and Sisk, William P., 4,987,073, Cl. 435-172.300.
SKF France: *See—*
Descombes, Michel, 4,986,605, Cl. 301-105.00R.
Sky Park AB: *See—*
Fernstrom, Goran, 4,986,714, Cl. 414-256.000.
Slater, Paul: *See—*
Kent, Steven; Downie, Sheila; and Slater, Paul, 4,986,288, Cl. 132-321.000.
Slegers, John: *See—*
Breslau, Barry R.; and Slegers, John, 4,986,918, Cl. 210-652.000.
Sloane, Thomas E., Jr.: *See—*
Blake, Joseph W., III; and Sloane, Thomas E., Jr., 4,986,813, Cl. 604-110.000.
Slob, Arie, to U.S. Philips Corp. Semiconductor memory with voltage stabilization. 4,987,558, Cl. 365-183.000.
Slocum, Alexander H.; and Thurston, Debra, to Massachusetts Institute of Technology. System to provide high speed, high accuracy motion. 4,987,526, Cl. 364-167.010.
Sluyts, Domien: *See—*
Denecker, Gabriel; Verhoeven, Werner; Leuridan, Joel; and Sluyts, Domien, 4,986,742, Cl. 423-82.000.
Smart, Bruce E.; and Webster, Owen W., to Du Pont de Nemours, E. I., and Company. Resins with high surface areas and porosities. 4,987,157, Cl. 521-50.000.
Smil, Norbert: *See—*
Lacotte, Phillipe G. V.; and Smil, Norbert, 4,985,951, Cl. 5-465.000.

Smith, Elizabath A.: *See*—
Johnson, Lee R.; Smith, Elizabath A.; and Myers, Howard L., 4,987,486, Cl. 358-86.000.
Smith, Frederick C. Floating lounge. 4,986,781, Cl. 441-130.000.
Smith, Jeremy G. B.: *See*—
Oliver, Raymond; Smith, Jeremy G. B.; and Villamagna, Fortunato, 4,986,858, Cl. 149-109.600.
Smith, Joseph P., Jr.: *See*—
Richards, John C.; and Smith, Joseph P., Jr., 4,986,305, Cl. 137-625.150.
Smith, Kenneth L.: *See*—
Harman, R. Keith; and Smith, Kenneth L., 4,987,394, Cl. 333-237.000.
Smith, Leon B.: *See*—
Young, Harold R.; McSpadden, John S.; McMordie, James R.; and Smith, Leon B., 4,986,445, Cl. 222-71.000.
Smith, Lonnie W., to Strauss, Robert E. Eyeglasses frame with improved frontal support. 4,986,649, Cl. 351-130.000.
Smith, Neil, to Eastman Kodak Company. Permanent magnet shaped to provide uniform biasing of a magnetoresistive reproduce head. 4,987,508, Cl. 360-113.000.
Smith, Todd; and Kelman, David C., to Boehringer Mannheim Corporation. Load sharing femoral hip implant. 4,986,834, Cl. 623-23.000.
Smith, Wilbur D.: *See*—
Cullor, James S., 4,987,079, Cl. 435-240.200.
Smithberger, Steven R.: *See*—
Beck, Arnold A.; Ruof, Edgar J.; Nedelk, John; Hurley, Ralph J.; and Smithberger, Steven R., 4,986,610, Cl. 303-93.000.
Snaper, Alvin A.; and Heatter, Merrill. Water-actuated novelty. 4,986,531, Cl. 272-27.00N.
SNE Enterprises, Inc.: *See*—
Weisner, Kent A., 4,986,039, Cl. 52-72.000.
Snelling, Christopher; and Mashtare, Dale R., to Xerox Corporation. Vacuum coupling arrangement for applying vibratory motion to a flexible planar member. 4,987,456, Cl. 355-273.000.
Snow, Paul D., Jr. Quick release face mask for use with contact sports helmets. 4,985,938, Cl. 2-424.000.
Snow, Steven A.; and Madore, Linda M., to Dow Corning Corporation. Softening compositions including quaternary ammonium functional siloxanes. 4,986,922, Cl. 252-8.800.
Soares, Schubert: *See*—
Brueck, Steven R. J.; Soares, Schubert; McArdle, Kristin; and Mullins, Bill W., 4,987,461, Cl. 357-19.000.
Sobel, Daniel. Pressure sensitive needle guard. 4,986,819, Cl. 604-198.000.
Societa' Cavi Pirelli S.p.A.: *See*—
Cecchi, Stefano; and Simonelli, Francesco, 4,986,663, Cl. 356-375.000.
Societe Anonyme dite: Compagnie Generale d'Electricite: *See*—
Auge, Jacques; and Beaufume, Pascale, 4,986,629, Cl. 350-96.330.
Societe Anonyme pour L'Etude et L'Exploitation des Procedes Georges Claude: *See*—
Dupont, Rene ; and Simonet, Guy, 4,986,978, Cl. 423-648.100.
Societe des Jeux d'Aquitaine: *See*—
Bonnet, Jean, 4,986,542, Cl. 273-118.00R.
Societe des techniques en Milieu Ionisant STMI: *See*—
Charamathieu, Andre ; Gouaillardou, Gerard; and Cizel, Jean-Pierre, 4,986,889, Cl. 204-279.000.
Societe Europeenne De Propulsion: *See*—
Dendol, Jean D.; Vives, Michel C.; and Bertone, Christian, 4,986,863, Cl. 156-194.000.
Societe National d'Etude et de Construction de Moteurs d'Aviation "S.N.E.C.M.A.": *See*—
Vosgien, Michel, 4,985,992, Cl. 29-889.700.
Societe Nationale Elf Aquitaine: *See*—
Czernichow, Jean, 4,986,350, Cl. 166-65.100.
Germanaud, Laurent; Truong Dinh, Nguyen; Marie, Gilbert; and Turello, Patrick, 4,986,924, Cl. 252-51.50A.
Societe Nationale Elf Aquitaine (Production): *See*—
Serna, Pierre, 4,986,902, Cl. 210-86.000.
Societe Semco: *See*—
Chibret, Jean; and Manni, Charles, 4,986,322, Cl. 141-319.000.
Sodtalbers, Erich W.: *See*—
Goron, John; Renza, Ronald G.; Crosby, Robert J.; and Sodtalbers, Erich W., 4,986,911, Cl. 210-396.000.
Soehner, William; and Wilber, Edward. Access cover security device. 4,986,096, Cl. 70-54.000.
Soga, Setsuo: *See*—
Mochizuki, Manabu; Kurotori, Tsuneo; Tsuruoka, Ichiro; Echigo, Katsuhiro; Takenouchi, Hiroaki; and Soga, Setsuo, 4,987,457, Cl. 355-285.000.
Sohn, Miriam: *See*—
Cohen, Jack S.; Chen, Chi-Wan; Myers, Charles E.; and Sohn, Miriam, 4,986,256, Cl. 128-653.400.
Soissons, Florent: *See*—
Glaros, Timothy L.; Soissons, Florent; and McEvoy, Joe, 4,986,992, Cl. 426-19.000.
Sollinger, Hans-Peter; and Madrzak, Zygmunt, to J. M. Voith GmbH. Roll with deflection compensation. 4,985,972, Cl. 29-116.200.
Sollman, John R.: *See*—
Johnson, Danny L.; Sollman, John R.; and Harker, Larry A., 4,987,538, Cl. 364-401.000.
Somar Corporation: *See*—
Hamamura, Fumio, 4,986,873, Cl. 156-552.000.
Somers, John E. Self-flaking sail system. 4,986,205, Cl. 114-104.000.
Son, Tae W.: *See*—
An, Tae W.; Jung, Jong K.; Yoo, Yung C.; Lee, Pil H.; and Son, Tae W., 4,987,208, Cl. 528-272.000.
Sondergeld, Manfred; and Goodin, Jonathan W., to Du Pont de Nemours, E. I., and Company. Photopolymerizable compositions with binders containing carboxyl groups. 4,987,054, Cl. 430-275.000.
Sonoda, Hidefumi: *See*—
Mori, Eiji; Sonoda, Hidefumi; Hiraku, Akira; Minezawa, Morio; Kato, Isao; and Ito, Koichi, 4,986,840, Cl. 55-316.000.
Sonoda, Rikuo: *See*—
Takagi, Kazuhiko; Sonoda, Rikuo; and Umemura, Kazuo, 4,986,525, Cl. 271-114.000.
Sonohara, Tsunetoshi: *See*—
Kobayashi, Toru; and Sonohara, Tsunetoshi, 4,986,144, Cl. 74-606.00R.
Sony Corporation: *See*—
Hurley, Terry R.; and Nishio, Naoki, 4,987,489, Cl. 358-105.000.
Yui, Yasuji; and Shirakura, Akira, 4,987,047, Cl. 430-138.000.
Soo, David C., to Chrontel, Inc. Monolithic phase-locked loop. 4,987,373, Cl. 328-155.000.
Sood, Pradeep K.; and Thorn, John S., to Emerson Electric Co. Speed control for inverter driven washing machine. 4,986,092, Cl. 68-12.00R.
Sorin, Wayne V., to Hewlett-Packard Company. Broadband tunable in-line filter for fiber optics. 4,986,623, Cl. 350-96.150.
Sorin, Wayne V.; and Shaw, Herbert J., to Leland Stanford Junior University, The Board of Trustees of the. Optical fiber evanescent grating reflector. 4,986,624, Cl. 350-96.190.
Sorio, George. Central air duct scooper humidifier. 4,986,937, Cl. 261-81.000.
Sorli, Oyvind: *See*—
Forwald, Karl; Schussler, Gunnar; and Sorli, Oyvind, 4,986,971, Cl. 423-342.000.
Soshi, Isao; Sato, Osamu; and Naruo, Teruhiko, to Asahi Kogaku Kogyo K.K. Camera's data imprinting device. 4,987,434, Cl. 354-106.000.
Soubrier, Pierre; and Bochtler, Frank, to Baxter International Inc. Automatic foil change unit. 4,986,485, Cl. 242-58.300.
Sougawa, Masafumi, to Sanshin Kogyo Kabushihi Kaisha. Two cycle engine. 4,986,780, Cl. 440-89.000.
Soulier, Roger, to Aluminium Pechiney. Apparatus for gravity-feed casting with a large number of ingot molds of metal of metal billets of multiple diameters. 4,986,337, Cl. 164-420.000.
Southall, Kenneth: *See*—
Rai, Vish; Dailey, Nils; Southall, Kenneth; Webster, Timothy; Leeke, Gordon; and Chu, Chaokang, 4,986,909, Cl. 210-198.300.
Southland Corporation, The: *See*—
Baccus, John B., Jr., 4,986,994, Cl. 426-330.300.
Southwest Canopy Company: *See*—
Montgomery, Jerry A.; and Parkhurst, Larry S., 4,986,446, Cl. 222-94.000.
SP Tyres UK Limited: *See*—
Watkins, David R.; Griffiths, Gerald A.; and Ingley, Peter, 4,986,326, Cl. 152-532.000.
Spadafora, Paul F.; Kaiser, John M.; and Davis, James R., to Nabisco Brands, Inc. Method and apparatus for spraying fluids. 4,986,475, Cl. 239-218.500.
Spalding & Evenflo Companies, Inc.: *See*—
Mariol, John V., 4,985,948, Cl. 5-99.100.
Spalding Sports Worldwide: *See*—
Sullivan, Michael J., 4,986,545, Cl. 273-235.00R.
Sparrow, James A.; and Lee, Yu C., to Westinghouse Electric Corp. Nuclear fuel assembly with expandable top nozzle subassembly. 4,986,959, Cl. 376-445.000.
Sparton Corporation: *See*—
Livshits, Mikhail; Lafferty, Gerald J., Jr.; and Rempinski, Donald R., 4,986,143, Cl. 74-475.000.
Speakman, Eugene R., to McDonnell Douglas Corporation. Method of installing interference fit sleeved fasteners having radiused intersection for stress coining. 4,985,979, Cl. 29-512.000.
Spears, Steven; and Walker, David, to Walker Digital Audio Video Systems, Inc. Video noise reduction system. 4,987,481, Cl. 358-36.000.
Speier, Wolfgang: *See*—
Ohlendorf, Rolf; Treyz, Willy; and Speier, Wolfgang, 4,986,801, Cl. 475-331.000.
Speights, Robert M.; Perna, Peter J.; and Downing, Steven L., to Coors BioTech, Inc. Method for inhibiting the growth of salmonella. 4,987,124, Cl. 514-23.000.
Spencer, James R.; and Mullendore, James A., to GTE Products Corporation. Fine grain tungsten heavy alloys containing additives. 4,986,961, Cl. 419-36.000.
Spencer, R. Wilson. Sample injection means. 4,986,138, Cl. 73-864.340.
Sphinxwerker Muller AG: *See*—
Tuma, Martin, 4,986,163, Cl. 89-196.000.
Spica, Joseph P., to 2500 Corporation, The. Portable display means. 4,986,209, Cl. 116-28.00R.
Splane, Robson L., Jr.: *See*—
Iams, John F.; and Splane, Robson L., Jr., 4,986,260, Cl. 128-24.00R.
Iams, John F.; and Splane, Robson L., Jr., 4,986,261, Cl. 128-25.00R.
Splitstoser, Bradley S.; and Klaeser, Richard, to H. G. Weber & Co., Inc. Continuous motion vertical conveyor. 4,986,411, Cl. 198-475.100.

Sprague Electric Company: *See*—
Dain, Lester C., 4,987,518, Cl. 361-517.000.
Hutchins, Clinton E.; Kuzia, Eugene W.; Schmidt, Phyllis M.; and Schroeder, Walter W., 4,987,519, Cl. 361-518.000.

Spriewald, Erika; Tappe, Gustav; and Meckl, Heinz, to Agfa-Gevaert Aktiengesellschaft. Photographic processing method. 4,987,058, Cl. 430-372.000.

Spry, Robert J., to United States of America, Air Froce. High efficiency nonlinear Kerr effect filter. 4,986,635, Cl. 350-311.000.

SS Pharmaceutical Co., Ltd.: *See*—
Kanamaru, Yoshihiko; Tokizawa, Minoru; Matsumoto, Masaru; Asaoka, Takemitsu; Matsuda, Hideaki; and Kuraishi, Tadayuki, 4,987,144, Cl. 514-383.000.

Staalkat B.V.: *See*—
van der Schoot, Jelle, 4,985,956, Cl. 15-3.130.

Stackhouse, Wyman H.; and Williamson, Ian M. Face shield system. 4,986,282, Cl. 128-857.000.

Staemmele, Siegfried: *See*—
Saur, Wolfgang; Tonolla, Robert; Taschke, Franz; and Staemmele, Siegfried, 4,986,443, Cl. 222-1.000.

Staerzl, Richard E.: *See*—
Hensel, Robert J.; and Staerzl, Richard E., 4,986,776, Cl. 440-87.000.

Stafford, Trevor G.: *See*—
Dickinson, Alan J.; and Stafford, Trevor G., 4,987,018, Cl. 428-36.900.

Stahlecker, Fritz; and Stahlecker, Hans, to Stahlecker, Fritz; and Stahlecker, Hans. Drafting unit for a spinning machine with movable cover. 4,985,967, Cl. 19-267.000.

Stahlecker, Hans: *See*—
Stahlecker, Fritz; and Stahlecker, Hans, 4,985,967, Cl. 19-267.000.

Stahlgruber Otto Gruber GmbH & Co.: *See*—
Metzger, Kai, 4,986,328, Cl. 157-1.240.

Stamicarbon B. V.: *See*—
Van Geem, Paul C.; and Janssen, Ludovicus H. W., 4,987,265, Cl. 568-435.000.

Stanfield, Zenas A. Seed corn sheller. 4,986,793, Cl. 460-47.000.

Stanford University: *See*—
Moore, Wayne A.; Nozaki, Tom, Jr.; Parks, David R.; Stovel, Richard T.; and Breitbard, Gary, 4,987,539, Cl. 364-413.080.

Stapel B.V.: *See*—
van Hemmen, Aldert J. M.; Wempe, Cornelis M. P.; and Balm, Martinus A., 4,986,011, Cl. 37-141.00T.

Starkey Laboratories, Inc.: *See*—
Preves, David A.; Rosengren, Brian P.; Holte, James E.; and Leonard, Myer S., 4,986,281, Cl. 128-782.000.

Starner, Steven J., to Eaton Corporation. Process and apparatus for reforming brake shoes. 4,986,101, Cl. 72-10.000.

State of Israel, Atomic Energy Commission, Soreg Nuclear Research Center: *See*—
Bornstein, Aharon; and Cinader, Gideon, 4,987,305, Cl. 250-352.000.

Stavrianopoulos, Jannis; Yang, Heuy-Lang; and Kelker, Norman E., to Enzo Biochem, Inc. In vivo labelling of polynucleotide sequences. 4,987,065, Cl. 435-5.000.

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Stefani, Francesco: *See*—
Schron, Dean; Kemeny, George A.; Pavlik, Dennis; and Stefani, Francesco, 4,986,161, Cl. 89-8.000.

Steinbeck, Karl: *See*—
Lantzsch, Reinhard; and Steinbeck, Karl, 4,987,251, Cl. 562-506.000.

Steiner, Eric L.; Weiss, Mark E.; and Samson, Jeffrey T., to On-Gard Systems, Inc. Needle unsheathing, resheathing and handling apparatus. 4,986,816, Cl. 604-192.000.

Steiner, Richard A., to Rostra Tool Company. Wire stripper with V-notch blade. 4,985,996, Cl. 30-90.100.

Steinhilber, Helmut. Desk top for stand-up and writing desk. 4,986,193, Cl. 108-27.000.

Steinhilber, Helmut. Sorting apparatus for document sheets and the like. 4,986,530, Cl. 271-297.000.

Steinmann, Helmut, to Roberts Bosch GmbH. Device for rain-induced switching on and off of an electric windscreen wiper motor. 4,987,354, Cl. 318-444.000.

Steinmetz, Heinrich: *See*—
Reichenbach, Hans; Hofle, Gerhard; Augustiniak, Hermann; Bedorf, Norbert; Gerth, Klaus; Irschik, Herbert; Jansen, Rolf; Kunze, Brigitte; Schomburg, Dietmar; Steinmetz, Heinrich; Trowitzsch-Kienast, Wolfram; and Wray, Victor, 4,987,072, Cl. 435-119.000.

Steinmetz, Michael A.; and Lintner, David E., to Cincinnati Milacron Inc. System for compensated motion of coupled robot axes. 4,986,724, Cl. 414-729.000.

Steltzer, Edward L., to Digital Equipment Corporation. Flexure guide for straight-line motion. 4,987,507, Cl. 360-106.000.

Stemp, Geoffrey: *See*—
Cassidy, Frederick; and Stemp, Geoffrey, 4,987,138, Cl. 514-320.000.

Stems, Wolfgang: *See*—
Radzio, Andrzej; and Stems, Wolfgang, 4,986,285, Cl. 131-280.000.

Stephani, Dietrich: *See*—
Schewe, Herbert; and Stephani, Dietrich, 4,987,510, Cl. 360-126.000.

Stephens, David N.: *See*—
Rohde, Ralph; Biere, Helmut; Schmiechen, Ralph; Andrews, John S.; and Stephens, David N., 4,987,146, Cl. 514-397.000.

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Sterler, Georg: *See*—
Bader, Heinz; and Sterler, Georg, 4,987,276, Cl. 200-61.45M.

Sterling, Roy E., to 501 Alberta Honey Producers Co-operative Limited. Product and process for preparation thereof. 4,986,855, Cl. 127-60.000.

Stewen, Wilhelm: *See*—
Wessiepe, Klaus; and Stewen, Wilhelm, 4,986,032, Cl. 49-477.000.

Sting, Benno; and Hartmann, Gerhard, to Siegenia-Frank KG. Closure connecting rod mechanism. 4,986,582, Cl. 292-336.300.

Stock, Alvin L.; and Groenendaal, John C., Jr., to Westinghouse Electric Corp. Steam turbine crossover piping with reduced turning losses. 4,986,732, Cl. 415-066.000.

Stoddart, Kenneth R.: *See*—
Lieberman, Harry A.; and Stoddart, Kenneth R., 4,985,959, Cl. 15-230.110.

Stoll, Helmut: *See*—
Krause, Hans; and Stoll, Helmut, 4,987,010, Cl. 427-103.000.

Stone & Webster Engineering Corporation: *See*—
Garabedian, George, 4,986,956, Cl. 376-283.000.

Storck, Karlheinz, to Carl Schenck AG. Method and apparatus for guidance and actuation of flat belt drive under external load. 4,986,795, Cl. 474-91.000.

Stordiau, Marc: *See*—
Bernard, Alain; and Stordiau, Marc, 4,986,203, Cl. 114-51.000.

Storey, David W.: *See*—
Almond, Gary R.; and Storey, David W., 4,987,570, Cl. 370-84.000.

Stormberg, Hans-Peter; Watanabe, Yoshio; and Ochiai, Isao, to U.S. Philips Corporation. Charged particle source of large current with high energy. 4,987,345, Cl. 315-111.210.

Stoudt, James E.: *See*—
Swarden, Michael C.; Faulkner, Henry B.; Brassert, Walter L.; and Stoudt, James E., 4,986,479, Cl. 241-15.000.

Stout, Richard W.; and Leibu, Henry J., to Du Pont de Nemours, E. I., and Company. Organic-based porous microspheres for HPLC. 4,986,908, Cl. 210-198.200.

Stout, Ron, deceased: *See*—
Harrison, John M.; Marshburn, Hubert L.; and Stout, Ron, deceased, 4,986,113, Cl. 73-49.200.

Stout, Sondra J., Administrator: *See*—
Harrison, John M.; Marshburn, Hubert L.; and Stout, Ron, deceased, 4,986,113, Cl. 73-49.200.

Stovel, Richard T.: *See*—
Moore, Wayne A.; Nozaki, Tom, Jr.; Parks, David R.; Stovel, Richard T.; and Breitbard, Gary, 4,987,539, Cl. 364-413.080.

Strachan, Brian: *See*—
Hopkins, James R.; and Strachan, Brian, 4,986,112, Cl. 73-49.200.

Stratton, Michael; and Jeake, Clifford O., to Caterpillar Inc. Articulated piston with a cooling recess having a preestablished volume therein. 4,986,167, Cl. 92-186.000.

Strauss, Robert E.: *See*—
Smith, Lonnie W., 4,986,649, Cl. 351-130.000.

Strippit Inc.: *See*—
Matrak, Edgard; and Hess, Robert L., 4,986,153, Cl. 83-25.000.

Stritzl, Karl: *See*—
Freisinger, Henry; Wurther, Hubert; Stritzl, Karl; and Brunhuber, Egon, 4,986,562, Cl. 280-633.000.

Stromath, David K.; and Wiler, Curtiss D., to Rockwell International Corporation. Cooling structure. 4,986,495, Cl. 244-117.00A.

Strong, Richard T., Jr.: *See*—
Kinnard, Kenneth P.; Strong, Richard T., Jr.; Goldfarb, Samuel; and Tower, John R., 4,987,295, Cl. 250-208.100.

Studio Tecnico Sviluppo E Ricerche S.T.S.R. s.r.l.: *See*—
Ferrari, Leopoldo, 4,986,306, Cl. 137-625.170.

Stults, Robert A.; Harrison, Steven R.; Merrow, Thomas E.; Laursen, Jane J.; Goodman, George O.; Trow, Jay; and Abel, Mark J. User interface control for communication system. 4,987,492, Cl. 358-181.000.

Stumpf, Walter, to Simmons U.S.A. Corporation. Pocketed coil strings having a flat overlap side seam. 4,986,518, Cl. 267-91.000.

Styles, George H.: *See*—
Atkins, Tom G.; Gray, Don E.; and Styles, George H., 4,987,013, Cl. 427-233.000.

Suarato, Antonino: *See*—
Bargiotti, Alberto; Suarato, Antonino; Zini, Pierangelo; Grandi, Maria; and Pezzoni, Gabriella, 4,987,126, Cl. 514-34.000.

Suchanek, Gunter: *See*—
Hartmann, Rudolf; Overlach, Knud; and Suchanek, Gunter, 4,986,004, Cl. 33-555.100.

Suda, Tomio: *See*—
Masaki, Hisanori; Torii, Kunio; and Suda, Tomio, 4,987,123, Cl. 514-19.000.

Sudo, Moriyasu: *See*—
Ohba, Yozo; Yamanaka, Masaaki; Sudo, Moriyasu; and Iwai, Akira, 4,986,866, Cl. 156-220.000.

Suemoto, Kiyoji: *See*—
Ohata, Hiroyuki; Tanaka, Masaki; Ohashi, Hiroshi; Suemoto, Kiyoji; Iida, Hidekazu; and Saga, Hiroshi, 4,987,180, Cl. 524-860.000.

Sueyoshi, Kouichi: *See*—
Ishii, Toshitsuga; Imai, Isao; Sano, Akira; and Sueyoshi, Kouichi, 4,986,972, Cl. 423-344.000.

Sugi, Hideo: *See*—
Haga, Takahiro; Yamada, Nobutoshi; Sugi, Hideo; Koyanagi, Toru; and Okada, Hiroshi, 4,987,135, Cl. 514-274.000.
Sugimoto, Hisashi: *See*—
Uchiyama, Futoshi; Agatsuma, Ko; Ohara, Takeshi; Tsukamoto, Koichi; Ishigami, Sumiyuki; Sato, Mitsuru; and Sugimoto, Hisashi, 4,986,670, Cl. 374-117.000.
Sugimoto, Konomu: *See*—
Takatsuki, Toyohiko; Yoshida, Masahiro; Sugimoto, Konomu; and Sakaguchi, Ryoichi, 4,986,452, Cl. 222-209.000.
Sugimoto, Kunihisa: *See*—
Ikegaya, Isao; Matsumoto, Tadashi; and Sugimoto, Kunihisa, 4,986,514, Cl. 297-362.000.
Sugiyama, Susumu; Yamashita, Shiro; and Funabashi, Hirofumi, to Kabushiki Kaisha Toyota Chuo Kenkyusho. Semiconductor strain detector. 4,986,131, Cl. 73-766.000.
Sullivan, John T. Fan coil unit. 4,986,087, Cl. 62-291.000.
Sullivan, Michael J., to Spalding Sports Worldwide. Golf ball compositions. 4,986,545, Cl. 273-235.00R.
Sulzer Brothers Limited: *See*—
Tiefenthaler, Edelbert, 4,986,512, Cl. 251-33.000.
Sumitomo Chemical Company, Limited: *See*—
Funaki, Yuji; and Fukushima, Masayuki, 4,987,247, Cl. 560-23.000.
Hayashida, Haruo; Kubo, Kouji; Nomura, Ryouichi; and Koyama, Satoru, 4,987,191, Cl. 525-227.000.
Kisida, Hirosi; Shuto, Akira; Tamaki, Masahiro; Imahase, Tomotoshi; and Fujimoto, Hiroaki, 4,987,145, Cl. 514-394.000.
Nakano, Kazuhiko; Matsuda, Norio; Murase, Mitsutoshi; and Murakami, Hideaki, 4,986,967, Cl. 422-188.000.
Sirosita, Masao; Mizutani, Masato; Kimura, Shigeko; Oguri, Yukio; Kitamura, Masaru; Umada, Youichi; and Sato, Hiroshi, 4,986,989, Cl. 424-635.000.
Suzukamo, Gohfu; and Fukao, Masami, 4,987,114, Cl. 502-341.000.
Takao, Hiroyoshi; Yoshida, Nobuyuki; Ikeda, Kiyosi; and Fukuyama, Masahiro, 4,987,199, Cl. 525-327.300.
Sumitomo Wiring System, Ltd.: *See*—
Wakata, Shigekazu, 4,986,758, Cl. 439-595.000.
Sun, Mei H.; and Wickersheim, Kenneth A., to Luxtron Corporation. Three-parameter optical fiber sensor and system. 4,986,671, Cl. 374-131.000.
Sunahara, Yonehiko; Matsunaga, Makoto; Mano, Seiji; Ohmine, Hiroyuki; and Tsuchiya, Makio, to Mitsubishi Denki Kabushiki Kaisha. Microstrip antenna. 4,987,421, Cl. 343-700.0MS.
Sundblad, Birgitta: *See*—
Svedin, Bjorn H.; Sundblad, Birgitta; and Engstrom, Jorgen, 4,986,973, Cl. 423-479.000.
Sundstrand Corporation: *See*—
Layer, John C.; and Metcalf, Jeffrey D., 4,986,734, Cl. 416-48.000.
Shahamat, Mohammad, 4,987,328, Cl. 310-68.00D.
Sundstrand Data Control, Inc.: *See*—
Grove, Michael M., 4,987,413, Cl. 340-970.000.
Suntory Limited: *See*—
Magota, Koji; Oshima, Takehiro; and Tanaka, Shoji, 4,987,070, Cl. 435-69.700.
Superspine, Inc.: *See*—
Iams, John F.; and Splane, Robson L., Jr., 4,986,260, Cl. 128-24.00R.
Iams, John F.; and Splane, Robson L., Jr., 4,986,261, Cl. 128-25.00R.
Surfaces, Inc.: *See*—
Cole, Joe S.; and Christopher, Neil B., 4,986,609, Cl. 303-9.690.
Surgical Laser Products, Inc.: *See*—
Wertz, Thomas J.; Todd, Russell W.; and Abell, Gerald D., 4,986,839, Cl. 55-274.000.
Susa, Andrea: *See*—
Gerosa, Alessandro; Rogora, Edoardo; Villa, Ezio; and Susa, Andrea, 4,987,404, Cl. 340-461.000.
Susko, Kenneth A., to COM-PRO Systems, Inc. Aircraft-de-icing system. 4,986,497, Cl. 244-134.00C.
Susukida, Masato: *See*—
Suzuki, Kunio; Fukada, Takeshi; Kinka, Mikio; Abe, Masayoshi; Shibata, Katsuhiko; Susukida, Masato; Ishida, Noriya; Satake, Akemi; and Arai, Yasuyuki, 4,987,005, Cl. 427-39.000.
Yamazaki, Shunpei; Suzuki, Kunio; Nagayama, Susumu; Inujima, Takashi; Abe, Masayoshi; Fukada, Takeshi; Kinka, Mikio; Kobayashi, Ippei; Shibata, Katsuhiko; Susukida, Masato; and Koyanagi, Kaoru, 4,986,213, Cl. 118-719.000.
Susumu, Honda: *See*—
Kiyoshi, Nara; and Susumu, Honda, 4,986,984, Cl. 424-85.500.
Sutter, Marius: *See*—
Bohlendorf, Bettina; Bedorf, Norbert; Hofle, Gerhard; Schummer, Dietmar; and Sutter, Marius, 4,987,149, Cl. 514-450.000.
Sutton, James A., Jr. Method of ventilating an animal enclosure in response to temperature. 4,986,469, Cl. 236-49.300.
Suzukamo, Gohfu; and Fukao, Masami, to Sumitomo Chemical Company, Limited. Solid base and process for producing the same for preparing internal olefins. 4,987,114, Cl. 502-341.000.
Suzuki, Goro; and Seiji, Matsuura, to Mitsui Petrochemical Industries, Ltd. Polyphenol-alkanolamine modified epoxy resin composition, process for preparation thereof and paint composition comprising this modified epoxy resin composition. 4,987,205, Cl. 528-104.000.
Suzuki Jidosha Kogyo Kabushiki Kaisha: *See*—
Kobayashi, Yoshiyuki, 4,986,236, Cl. 123-339.000.
Nishino, Yutaro; and Kondoh, Kihachi, 4,986,566, Cl. 280-688.000.
Suzuki, Koichi: *See*—
Oya, Eiichi; Watanabe, Junichi; Kondo, Yasuo; Kakuta, Takuya; Suzuki, Koichi; Nawamaki, Tsutomu; and Watanabe, Shigeomi, 4,986,845, Cl. 71-92.000.
Suzuki, Kunio; Fukada, Takeshi; Kinka, Mikio; Abe, Masayoshi; Shibata, Katsuhiko; Susukida, Masato; Ishida, Noriya; Satake, Akemi; and Arai, Yasuyuki, to Semiconductor Energy Laboratory Co., Ltd. Chemical vapor processing method for deposition or etching on a plurality of substrates. 4,987,005, Cl. 427-39.000.
Suzuki, Kunio: *See*—
Yamazaki, Shunpei; Suzuki, Kunio; Nagayama, Susumu; Inujima, Takashi; Abe, Masayoshi; Fukada, Takeshi; Kinka, Mikio; Kobayashi, Ippei; Shibata, Katsuhiko; Susukida, Masato; and Koyanagi, Kaoru, 4,986,213, Cl. 118-719.000.
Suzuki, Mariko: *See*—
Ishikawa, Masayuki; Okuda, Hajime; Shiozawa, Hideo; Itaya, Kazuhiko; Watanabe, Yukio; Suzuki, Mariko; and Hatakoshi, Genichi, 4,987,096, Cl. 437-129.000.
Suzuki, Masao: *See*—
Suzuki, Shin; Sasaki, Shuichi; and Suzuki, Masao, 4,986,229, Cl. 123-179.03G.
Suzuki, Shin; Sasaki, Shuichi; and Suzuki, Masao, to Walbro Far East, Inc. Apparatus for supplying start fuel for a carburetor. 4,986,229, Cl. 123-179.00G.
Suzuki, Takaaki; and Gotou, Hiroshi, to Fujitsu Limited. Semiconductor dram device having a trench. 4,987,470, Cl. 357-049.000.
Suzuki, Takami; Chinomi, Isamu; Tanaka, Yuji; and Kuwabara, Isao, to Ikeda Bussan Co., Ltd. Seat lifter. 4,986,509, Cl. 248-396.000.
Suzuki, Takehiko: *See*—
Kurono, Masayasu; Yamakawa, Hidehumi; Koshizaka, Takuya; Suzuki, Takehiko; Kato, Eiichi; Iida, Takafumi; Ohishi, Nobuko; and Yagi, Kunio, 4,987,150, Cl. 514-455.000.
Suzuki, Takeshi: *See*—
Mase, Toshiyasu; Hara, Hiromu; Nagaoka, Hitoshi; Takahashi, Takumi; Suzuki, Takeshi; Tomioka, Kenichi; and Yamada, Toshimitsu, 4,987,132, Cl. 514-252.000.
Suzuki, Tetsumi; Murayama, Tetsuo; Ono, Hitoshi; and Ando, Osamu, to Mitsubishi Kasei Corporation. Photosensitive member for electrophotography. 4,987,045, Cl. 430-59.000.
Suzuki, Toshihiko; and Shirai, Kenichi, to Yokohama Rubber Co., Ltd., The. Pneumatic tire tread with symmetrical grooves having a bent shoulder portion. 4,986,324, Cl. 152-209.00R.
Suzuki, Yoshiyuki: *See*—
Tamura, Kazuhiko; Sato, Atsushi; Aizawa, Yutaka; and Suzuki, Yoshiyuki, 4,987,424, Cl. 343-795.000.
Svedin, Bjorn H.; Sundblad, Birgitta; and Engstrom, Jorgen, to Eka Nobel AB. Process for the production of chlorine dioxide. 4,986,973, Cl. 423-479.000.
SVG Lithography Systems, Inc.: *See*—
Laganza, Joseph L.; and Engelbrecht, Orest, 4,986,007, Cl. 33-621.000.
Swarden, Michael C.; Faulkner, Henry B.; Brassert, Walter L.; and Stoudt, James E., to Ingersoll-Rand Company. Fluid jet shredder apparatus and method of use. 4,986,479, Cl. 241-15.000.
Swatch A.G.: *See*—
Niklaus, Bruno, 4,986,426, Cl. 211-13.000.
Sweeney, Harold E.; Titterton, Paul J.; and Leonard, Donald A., to GTE Government Systems Corporation. Apparatus for measuring diffuse attenuation coefficient of sea water. 4,986,655, Cl. 356-73.000.
Sweeney, Harold E.; Titterton, Paul J.; and Leonard, Donald A., to GTE Government Systems Corporation. Method of remotely measuring diffuse attenuation coefficient of sea water. 4,986,656, Cl. 356-73.000.
Szentai, Gyorgy: *See*—
Pera, Ferenc; Szentai, Gyorgy; Kesseru, Zsolt; Toth, Peter; and Kapolyi, Laszlo , 4,986,696, Cl. 405-36.000.
Tabas, Ira A., to Columbia University in the City of New York, The Trustees of. Triterpene derivatives cholesterol acyltransferase inhibitors and methods of using same. 4,987,151, Cl. 514-548.000.
Tachi-S Co., Ltd.: *See*—
Hanai, Toshimichi; Nagashima, Hideyuki; and Fujita, Yasuyuki, 4,986,603, Cl. 297-468.000.
Tachi, Shinichi; Tsujimoto, Kazunori; and Okudaira, Sadayuki, to Hitachi, Ltd. Method of dry etching. 4,986,877, Cl. 156-643.000.
Tachikawa, Hitoshi: *See*—
Kumata, Kabsuhiko; Endo, Isao; and Tachikawa, Hitoshi, 4,986,718, Cl. 414-421.000.
Tachino, Noboru: *See*—
Koshiba, Yoshikazu; Ikegami, Yuji; Tachino, Noboru; and Kamiya, Takeshi, 4,987,000, Cl. 427-11.000.
Taft, Philip A.; and Knight, Michael D., to Lucas Industries. Brake actuator. 4,986,394, Cl. 188-364.000.
Tagami, Takashi: *See*—
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Taguchi, Masayuki: *See*—
Kanbe, Toru; Taguchi, Masayuki; and Sato, Katsunobu, 4,986,441, Cl. 221-130.000.
Taipale, Jyrki; and Sarantola, Jaakko, to Yhtyneet Paperitehtaat Oy. Method for calendering paper and paper manufactured by the method. 4,986,883, Cl. 162-205.000.
Taisei Kiso Sekkei Co., Ltd.: *See*—
Yanagisawa, Koichi; and Hirata, Yoichi, 4,986,120, Cl. 73-155.000.
Tajima, Takahiro: *See*—
Saito, Keiji; Ichimura, Katsuhiko; and Tajima, Takahiro, 4,987,548, Cl. 364-498.000.

Tajima, Yoshio, to Yokohama Rubber Co., Ltd., The. Process for acceleratively vulcanizing rubbers with protein serum. 4,987,196, Cl. 525-346.000.

Takada, Yoshikazu: *See*—
Masuda, Sadakazu; Fujita, Fumio; Kamata, Masamoto; Yoshini, Masahiko; Arizumi, Takashi; Okami, Yuji; Takada, Yoshikazu; and Inagaki, Junichi, 4,986,341, Cl. 164-477.000.

Takagi, Hiroshi; Mori, Yoshiaki; Tani, Hiroji; and Sakabe, Yukio, to Murata Manufacturing Co., Ltd. Dielectric paste. 4,987,108, Cl. 501-138.000.

Takagi, Kazuhiko; Sonoda, Rikuo; and Umemura, Kazuo, to Brother Kogyo Kabushiki Kaisha. Sheet feed device for use in a printer or the like. 4,986,525, Cl. 271-114.000.

Takagi, Yuuji: *See*—
Fukushima, Yoshibisa; Satoh, Isao; Ichinose, Makoto; Kuroki, Yuzaru; and Takagi, Yuuji, 4,986,668, Cl. 369-59.000.

Takahama, Toru: *See*—
Zumoto, Nobuyuki; Takahama, Toru; Hoshinouchi, Susumu; and Morita, Noriko, 4,986,214, Cl. 118-722.000.

Takahashi, Katsuhiro; Yonezu, Kazuyoshi; Yasuda, Hiroshi; Sano, Ichiro; and Kimura, Toshiaki, to Matsushita Electric Industrial Co., Ltd. Method for making electrode plate for lead storage batteries. 4,986,317, Cl. 141-1.100.

Takahashi, Katsutoshi: *See*—
Nowatari, Hiroyoshi; Hayami, Hiroshi; Kuroda, Yasuo; Yoda, Sumio; and Takahashi, Katsutoshi, 4,987,246, Cl. 556-137.000.

Takahashi, Koichiro: *See*—
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Takahashi, Masato: *See*—
Tatematsu, Shinzo; Omata, Kazuki; Hashimoto, Tatsuo; Takahashi, Masato; and Ito, Noriichi, 4,987,031, Cl. 428-402.200.

Takahashi, Saburou: *See*—
Seo, Ikuo; Takahashi, Saburou; and Ohono, Tooru, 4,986,893, Cl. 208-39.000.

Takahashi, Sankichi: *See*—
Koseki, Yasuo; Yamada, Akira; Kurokawa, Hideaki; Ohkouchi, Isao; Ebara, Katsuya; and Takahashi, Sankichi, 4,986,079, Cl. 62-59.000.

Takahashi, Susumu: *See*—
Yokota, Akira; Fukuda, Hiroyuki; and Takahashi, Susumu, 4,986,642, Cl. 350-432.000.

Takahashi, Takumi: *See*—
Mase, Toshiyasu; Hara, Hiromu; Nagaoka, Hitóshi; Takahashi, Takumi; Suzuki, Takeshi; Tomioka, Kenichi; and Yamada, Toshimitsu, 4,987,132, Cl. 514-252.000.

Takahashi, Toshiharu: *See*—
Endo, Masahisa; Noto, Nobuhiko; and Takahashi, Toshiharu, 4,987,472, Cl. 357-60.000.

Takahashi, Yasunobu: *See*—
Higashitsuji, Ken; Kimoto, Hiroshi; Takahashi, Yasunobu; Kojima, Teruhisa; and Nadehara, Yutaka, 4,987,172, Cl. 524-416.000.

Takahashi, Yutaka; Harashima, Ikuo; Nakayama, Shunichi; Arai, Yasuyuki; Takayanagi, Yasushi; Sekiguchi, Ryoichi; Abe, Tomomitsu; and Hayakawa, Hiroshi, to Sanden Corporation; and Kirin Brewery Co., Ltd. Beverage dispensing unit with a control unit for controlling dispensation of a beverage. 4,986,448, Cl. 222-129.100.

Takahasi, Kenji: *See*—
Yamada, Hiromi; Yoshida, Eiji; and Takahasi, Kenji, 4,986,625, Cl. 350-96.200.

Takahira, Koji, to Toyo Tire & Rubber Co., Ltd. Low profile radial tires for trucks and buses reinforced with steel carcass ply cords. 4,986,327, Cl. 152-556.000.

Takai, Kazumitsu: *See*—
Yamamoto, Tadashi; Takai, Kazumitsu; and Shimizu, Akira, 4,987,332, Cl. 310-309.000.

Takaku, Kazuo: *See*—
Ishikawa, Yuichi; Yoshimura, Toshihiko; Shimizu, Tasuku; Otaka, Masahiro; and Takaku, Kazuo, 4,987,367, Cl. 324-227.000.

Takamatsu, Hideo: *See*—
Maeda, Miduho; Takamatsu, Hideo; Ishii, Masao; and Minatono, Shobu, 4,987,194, Cl. 525-314.000.

Takano, Hideki: *See*—
Komeno, Minoru; Hirao, Motoaki; Takeuchi, Toshiyuki; Nozoe, Shunpei; Takano, Hideki; and Yoshida, Katsunori, 4,986,199, Cl. 110-347.000.

Takano, Hiroyuki: *See*—
Shimizu, Shigeo; and Takano, Hiroyuki, 4,987,129, Cl. 514-206.000.

Takano, Yuichi: *See*—
Kushibe, Takahiro; Takano, Yuichi; Tateno, Manabu; Ohno, Eishi; and Shirabe, Naotaka, 4,986,247, Cl. 123-533.000.

Takao, Hiroyoshi; Yoshida, Nobuyuki; Ikeda, Kiyosi; and Fukuyama, Masahiro, to Sumitomo Chemical Company, Limited. Ethylene-acrylic acid ester copolymer and process for producing the same. 4,987,199, Cl. 525-327.300.

Takaoka, Akio; Koike, Noriyuki; and Fujii, Hideki, to Shin-Etsu Chemical Co., Ltd. Oligohexafluoropropylene oxide compound terminated with vinyl group at its one end. 4,987,267, Cl. 568-615.000.

Takasaki, Takashi; Yanai, Reikichi; Amakawa, Shigeru; Takizawa, Yoichi; and Iwamoto, Akira, to Nihon Bussan Kabushiki Kaisha. Anti-denaturation agent for edible paste product. 4,986,999, Cl. 426-656.000.

Takase, Tsugiko; Adachi, Hideo; Okada, Takao; Shimazu, Hisanari; and Tomabechi, Hideo, to Olympus Optical Co., Inc. Micro-displacement detector device, piezo-actuator provided with the micro-displacement detector device and scanning probe microscope provided with the piezo-actuator. 4,987,303, Cl. 250-306.000.

Takashio, Masachika; Chikano, Takahide; and Kamimura, Minoru, to Sapporo Breweries Limited. Uricase and a method for the preparation thereof. 4,987,076, Cl. 435-191.000.

Takasu, Katsuji; Sano, Masafumi; Tsuda, Hisanori; and Hirai, Yutaka, to Canon Kabushiki Kaisha. Light emitting device. 4,987,460, Cl. 357-17.000.

Takatani, Muneo: *See*—
Tsushima, Susumu; Takatani, Muneo; and Hirata, Minoru, 4,987,130, Cl. 514-210.000.

Takatsuki, Toyohiko; Yoshida, Masahiro; Sugimoto, Konomu; and Sakaguchi, Ryoichi, to Zojirushi Corporation. Pumping device for liquid containers. 4,986,452, Cl. 222-209.000.

Takayama, Shigeru, to NEC Corporation. Interruption control circuit. 4,987,535, Cl. 364-200.000.

Takayanagi, Yasushi: *See*—
Takahashi, Yutaka; Harashima, Ikuo; Nakayama, Shunichi; Arai, Yasuyuki; Takayanagi, Yasushi; Sekiguchi, Ryoichi; Abe, Tomomitsu; and Hayakawa, Hiroshi, 4,986,448, Cl. 222-129.100.

Takeda Chemical Industries, Ltd.: *See*—
Kiyoshi, Nara; and Susumu, Honda, 4,986,984, Cl. 424-85.500.
Komiya, Kiyoshi; and Nakamura, Yoshimasa, 4,986,948, Cl. 264-257.000.
Tsushima, Susumu; Takatani, Muneo; and Hirata, Minoru, 4,987,130, Cl. 514-210.000.

Takeda, Kazuo, to Kabushiki Kaisha Toshiba. Regular-internal mail feeding apparatus. 4,986,423, Cl. 209-540.000.

Takeda, Shigefumi: *See*—
Matsuoko, Yoshiyuki; Hosaka, Kunio; Takeda, Shigefumi; and Mitsuhashi, Hiroshi, 4,987,240, Cl. 549-436.000.

Takeda, Yukio. Buoyant force control apparatus for scuba diving. 4,986,700, Cl. 405-186.000.

Takei, Nobuo: *See*—
Anzue, Kaoru; Isomoto, Jun; and Takei, Nobuo, 4,986,552, Cl. 277-38.000.

Takemura, Yasuhiko: *See*—
Sato, Hozumi; Shimada, Humito; Sakaguchi, Akio; Takemura, Yasuhiko; Nishi, Tadaaki; Ono, Hisao; Nagano, Masanobu; and Miyachi, Takumi, 4,987,017, Cl. 428-36.800.

Takenouchi, Hiroaki: *See*—
Mochizuki, Manabu; Kurotori, Tsuneo; Tsuruoka, Ichiro; Echigo, Katsuhiro; Takenouchi, Hiroaki; and Soga, Setsuo, 4,987,457, Cl. 355-285.000.

Takeuchi, Fumio: *See*—
Narumi, Kazuhito; Takeuchi, Fumio; and Sakaguchi, Michiaki, 4,987,107, Cl. 501-137.000.

Takeuchi, Ikuo: *See*—
Hamada, Tomoyuki; Kamezima, Kohzi; Takeuchi, Ikuo; and Watanabe, Yuriko, 4,987,527, Cl. 364-167.010.

Takeuchi, Toshiyuki: *See*—
Komeno, Minoru; Hirao, Motoaki; Takeuchi, Toshiyuki; Nozoe, Shunpei; Takano, Hideki; and Yoshida, Katsunori, 4,986,199, Cl. 110-347.000.

Takeyama, Sadayuki: *See*—
Akimoto, Hirofumi; Takeyama, Sadayuki; Hiki, Toshimichi; and Kondo, Masayuki, 4,986,860, Cl. 156-78.000.

Takeyasu, Hiromitsu: *See*—
Watabe, Takashi; Takeyasu, Hiromitsu; Doi, Takao; and Kunii, Nobuaki, 4,987,271, Cl. 568-621.000.

Takikawa, Kazunori: *See*—
Hitachi, Yuzo; and Takikawa, Kazunori, 4,987,034, Cl. 428-593.000.

Takiyama, Nobuyuki: *See*—
Komamura, Tawara; Takiyama, Nobuyuki; and Katoh, Katsunori, 4,987,049, Cl. 430-203.000.

Takizawa, Yoichi: *See*—
Takasaki, Takashi; Yanai, Reikichi; Amakawa, Shigeru; Takizawa, Yoichi; and Iwamoto, Akira, 4,986,999, Cl. 426-656.000.

Tamai, Shoji: *See*—
Ohta, Masahiro; Kawashima, Saburo; Iiyama, Katsuaki; Tamai, Shoji; Oikawa, Hideaki; and Yamaguchi, Akihiro, 4,987,197, Cl. 525-436.000.

Tamaki, Masahiro: *See*—
Kisida, Hirosi; Shuto, Akira; Tamaki, Masahiro; Imahase, Tomotoshi; and Fujimoto, Hiroaki, 4,987,145, Cl. 514-394.000.

Tamaschke, Walter: *See*—
Otto, Gerhard; and Tamaschke, Walter, 4,985,983, Cl. 29-568.000.

Tambay, Jean P. Anti-jackknifing device for articulated road vehicles. 4,986,560, Cl. 280-432.000.

Tamglass Oy: *See*—
Peltonen, Esko J., 4,986,842, Cl. 65-104.000.

Tamura, Kaoru; and Torii, Shumpeita, to Fuji Photo FIlm Co., Ltd. Cassette for stimulable phosphor sheet. 4,987,308, Cl. 250-484.100.

Tamura, Kazuhiko; Sato, Atsushi; Aizawa, Yutaka; and Suzuki, Yoshiyuki, to Yagi Antenna Co., Ltd. Film antenna apparatus. 4,987,424, Cl. 343-795.000.

Tanaka, Akihiro: *See*—
Ito, Noriki; Nagano, Yoshinobu; Tanaka, Akihiro; Numasaki, Yoso; and Takahashi, Koichiro, 4,987,147, Cl. 514-399.000.

Tanaka, Hajime: *See*—
Itou, Takeo; Matsuda, Hidemi; and Tanaka, Hajime, 4,987,338, Cl. 313-478.000.

Tanaka, Masaki: *See*—
Ohata, Hiroyuki; Tanaka, Masaki; Ohashi, Hiroshi; Suemoto, Kiyoji; Iida, Hidekazu; and Saga, Hiroshi, 4,987,180, Cl. 524-860.000.

Tanaka, Mitsugu: *See*—
Mikoshiba, Hisashi; Tanaka, Mitsugu; and Kubodera, Seiiti, 4,987,120, Cl. 503-227.000.

Tanaka, Shoji: *See*—
Magota, Koji; Oshima, Takehiro; and Tanaka, Shoji, 4,987,070, Cl. 435-69.700.

Tanaka, Shuhei: *See*—
Oyoshi, Keiji; Tagami, Takashi; and Tanaka, Shuhei, 4,986,841, Cl. 65-30.130.

Tanaka, Takashi: *See*—
Ohto, Takashi; Tanaka, Takashi; and Sato, Makoto, 4,987,016, Cl. 428-34.100.

Tanaka, Yoshichika: *See*—
Sato, Goro; Komatsu, Michio; Nishida, Hiroyasu; Tanaka, Yoshichika; Koyanagi, Tsuguo; and Mihara, Kei-ichi, 4,987,012, Cl. 427-221.000.

Tanaka, Yuji: *See*—
Suzuki, Takami; Chinomi, Isamu; Tanaka, Yuji; and Kuwabara, Isao, 4,986,509, Cl. 248-396.000.

Tanamura, Yuji: *See*—
Yamazaki, Shunpei; Urata, Kazuo; Tashiro, Mamoru; Tanamura, Yuji; and Imato, Shinji, 4,987,008, Cl. 427-53.100.

Tandon, Jag S., to American Environmental International, Inc. Filter system to remove environmentally harmful products. 4,986,836, Cl. 55-161.000.

Tang, Horace T. S.: *See*—
Clark, Connie M.; Harding, Warren B.; and Tang, Horace T. S., 4,987,533, Cl. 364-200.000.

Tani, Hiroji: *See*—
Takagi, Hiroshi; Mori, Yoshiaki; Tani, Hiroji; and Sakabe, Yukio, 4,987,108, Cl. 501-138.000.

Tanigawa, Toru; Kurihara, Masaaki; Fujii, Yasuji; and Inaba, Toshiaki, to Furukawa Electric Co., Ltd., The; and Furukawa Special Metal Co., Ltd. Fine copper wire for electronic instruments and method of manufacturing the same. 4,986,856, Cl. 148-11.50C.

Tanihara, Koichi, to Japan as represented by Director General of Agency of Industrial Science and Technology. Method for recovering gallium value from aqueous solution of crude aluminum salt. 4,986,969, Cl. 423-115.000.

Tanoue, Junichi: *See*—
Nishii, Michiharu; Mizuno, Genji; Nomura, Yoshihisa; Kato, Masahiko; Shirai, Kenji; and Tanoue, Junichi, 4,986,613, Cl. 303-114.000.

Tapeswitch Corporation of America: *See*—
Duhon, Edward W., 4,987,277, Cl. 200-86.00R.

Tappe, Gustav: *See*—
Spriewald, Erika; Tappe, Gustav; and Meckl, Heinz, 4,987,058, Cl. 430-372.000.

Target Products Inc.: *See*—
Meister, Donald F., 4,986,604, Cl. 299-39.000.

Taschke, Franz: *See*—
Saur, Wolfgang; Tonolla, Robert; Taschke, Franz; and Staemmele, Siegfried, 4,986,443, Cl. 222-1.000.

Tashiro, Mamoru: *See*—
Yamazaki, Shunpei; Urata, Kazuo; Tashiro, Mamoru; Tanamura, Yuji; and Imato, Shinji, 4,987,008, Cl. 427-53.100.

Tatematsu, Shinzo; Omata, Kazuki; Hashimoto, Tatsuo; Takahashi, Masato; and Ito, Noriichi. Capsule. 4,987,031, Cl. 428-402.200.

Tatematsu, Susumu: *See*—
Hida, Junichi; Uchida, Naoya; and Tatematsu, Susumu, 4,986,081, Cl. 62-130.000.

Tateno, Manabu: *See*—
Kushibe, Takahiro; Takano, Yuichi; Tateno, Manabu; Ohno, Eishi; and Shirabe, Naotaka, 4,986,247, Cl. 123-533.000.

Tavolieri, George. Folding handle for twin blade cartridge. 4,985,994, Cl. 30-47.000.

Taylor, Dale F., to General Electric Company. Corrosion resistant zirconium alloys containing copper, nickel and iron. 4,986,957, Cl. 376-417.000.

Taylor, Harvey W., Jr., to Du Pont de Nemours, E. I., and Company. Image-reversal process using photosensitive peel-apart elements. 4,987,051, Cl. 430-253.000.

TDK Corporation: *See*—
Iwaya, Shouichi; Hamada, Munemitsu; and Masumura, Hitoshi, 4,987,515, Cl. 361-321.000.
Nakamura, Kiichi; Itakura, Masami; Atsumi, Yasuhiko; Watanabe, Hideo; and Kanagawa, Youiti, 4,987,009, Cl. 427-96.000.

Teac Corporation: *See*—
Uehara, Keiji, 4,987,506, Cl. 360-105.000.

Technical Survey Services Ltd.: *See*—
Luscombe, John, 4,986,121, Cl. 73-170.00A.

Tedder, Thomas F.; Schlossman, Stuart F.; and Saito, Haruo, to Dana Farber Cancer Institute. Method of testing the effect of a molecule on B lymphocyte function. 4,987,084, Cl. 436-63.000.

Teegen, Walter: *See*—
Kessler de Vivie, Achill; Linder, Ernst; Rembold, Helmut; Ruoff, Manfred; and Teegen, Walter, 4,986,246, Cl. 123-520.000.

Teepack Spezialmaschinen GmbH & Co. KG: *See*—
Rambold, Adolf, 4,986,455, Cl. 222-368.000.

Tehrani, Fleur T. Method and apparatus for controlling an artificial respirator. 4,986,268, Cl. 128-204.220.

Tehrani, Saied N.: *See*—
Goronkin, Herbert; and Tehrani, Saied N., 4,987,463, Cl. 357-022.000.

Teledyne Princeton, Inc.: *See*—
Thompson, Thomas K.; and Mauck, Jack R., 4,986,387, Cl. 180-212.000.

Tener, Dean R.: *See*—
Kosmatka, Walter J.; Zalar, Frank E.; and Tener, Dean R., 4,987,343, Cl. 315-82.000.

Teng, Clarence W.; and Haken, Roger A., to Texas Instruments Incorporated. Through-field implant isolated devices and method. 4,987,093, Cl. 437-69.000.

Tennant Company: *See*—
Kasper, Joseph G., 4,986,378, Cl. 180-6.480.

Teo, Pek B.: *See*—
Prakash, Chacko; Ng, Yong K.; and Teo, Pek B., 4,987,388, Cl. 331-158.000.

Tepper, Harry W. Oral appliance for tongue thrust correction. 4,986,283, Cl. 128-859.000.

Terada, Masaji. Key using a synthetic resin bow. 4,986,100, Cl. 70-395.000.

Terada, Yasuharu; and Ishii, Susumu, to Yoshida Kogyo, K.K. Slider for slide fasteners. 4,985,969, Cl. 24-429.000.

Terai, Fumitaka; Yamagami, Hiroyuki; Uchino, Nobuhiko; and Okazaki, Masaki, to Fuji Photo Film Co., Ltd. Process for preparing a silver halide emulsion. 4,987,062, Cl. 430-546.000.

Teramoto, Mitsutake; Saito, Shinkichi; Okumoto, Takaharu; and Asabuki, Hideyo, to Yokohama Rubber Co., Ltd., The. Iron golf club set. 4,986,541, Cl. 273-77.00A.

Terashima, Takeshi: *See*—
Yamamoto, Hiroshi; and Terashima, Takeshi, 4,987,335, Cl. 313-103.00R.

Terazawa, Tadashi, to Aisin Seiki Kabushiki Kaisha. Throttle control system. 4,986,238, Cl. 123-361.000.

Terui, Takashi: *See*—
Ishii, Akira; Terui, Takashi; Hiraoka, Toyoki; and Murakami, Yuichi, 4,986,235, Cl. 123-195.00C.

Terumo Kabushiki Kaisha: *See*—
Yamaguchi, Keiji, 4,986,669, Cl. 374-107.000.
Yoshinaka, Yasuhiro; and Muramoto, Yutaka, 4,987,579, Cl. 377-25.000.

Teshima, Shinichi: *See*—
Ishimaru, Katsutoshi; Shimada, Akira; Teshima, Shinichi; and Hayashi, Yuzo, 4,987,067, Cl. 435-22.000.

Tessier, Sylvie, executor: *See*—
Leblanc, Roland; and Boutin, Gaetan, deceased, 4,986,600, Cl. 297-238.000.

Tetra Park Holdings & Finance S.A.: *See*—
Jacobsson, Kent; and Carlsson, Hans, 4,986,465, Cl. 229-123.300.

Tetsutani, Nobuji: *See*—
Ichinose, Susumu; Tetsutani, Nobuji; and Ishibashi, Morito, 4,987,487, Cl. 358-92.000.

Tetzlaff, Heribert: *See*—
Lendle, Wilhelm; Scheibitz, Wolfgang; Tetzlaff, Heribert; and Wojtech, Bernhard, 4,986,974, Cl. 423-488.000.

Texas Instruments Incorporated: *See*—
Kim, Bumman; and Tserng, Hua Q., 4,987,462, Cl. 357-22.000.
Teng, Clarence W.; and Haken, Roger A., 4,987,093, Cl. 437-69.000.

Textron Inc.: *See*—
Milliser, John S.; and McGuire, James T., 4,985,978, Cl. 29-511.000.

Tharman, Paul A., to Briggs & Stratton Corporation. Low oil pressure interlock switch. 4,986,228, Cl. 123-179.0BG.

Thead, William H.; and Evans, John C., to Post Medical, Inc. Apparatus and method for safely removing needles from syringes. 4,986,811, Cl. 604-110.000.

Theeuwes, Felix: *See*—
Ayer, Atul D.; Theeuwes, Felix; and Wong, Patrick S. L., 4,986,987, Cl. 424-473.000.

Theis, Jurgen: *See*—
Herbrechtsmeier, Peter; Theis, Jurgen; and Wieners, Gerhard, 4,986,630, Cl. 350-96.340.

ThermaLock Products, Inc.: *See*—
Kennedy, Francis A.; Neff, John P.; and Blake, Kenneth J., 4,986,049, Cl. 52-309.120.

Theurer, Josef; and Gollner, Josef, to Franz Plasser Bahnbaumaschinen-Industriegesellschaft m.b.H. Mobile track working machine. 4,986,189, Cl. 104-12.000.

Thielke, Dietrich: *See*—
Hoeltje, Dagmar; and Thielke, Dietrich, 4,987,137, Cl. 514-294.000.

Thomas A. Schutz Co., Inc.: *See*—
Eckert, Ronald P., 4,986,017, Cl. 40-622.000.

Thomas, James R.: *See*—
Poklemba, John J.; and Thomas, James R., 4,987,386, Cl. 331-10.000.

Thomas, John V. Automobile medallion anti-theft locking device. 4,986,606, Cl. 301-108.00R.

Thomas, Kent R. Fish net and method of capturing fish. 4,986,021, Cl. 43-14.000.

Thomas, Phillip M.: *See*—
Gladden, Robert H., Jr.; and Thomas, Phillip M., 4,986,761, Cl. 439-99.000.

Thompson, Jerome W.: *See*—
Fleury, Jean-Luc P.; Thompson, Jerome W.; and Kanigowski, Voytek, 4,986,733, Cl. 415-230.000.

Thompson, Thomas K.; and Mauck, Jack R., to Teledyne Princeton, Inc. Fork-lift truck having three drive wheels with third wheel steerable. 4,986,387, Cl. 180-212.000.

Thompson, William J., to Bill's Ice Cream, Inc. Self-contained rechargeable battery power source with voltage reducer. 4,987,360, Cl. 320-6.000.

Thomson-Brandt Armements: *See*—
Denis, Jean-Francois; and Thouron, Rene , 4,986,188, Cl. 102-493.000.

Thomson-CSF: *See*—
Bouko, Jean, 4,987,423, Cl. 343-741.000.
Olivier, Jean; and Pribat, Didier, 4,986,787, Cl. 445-24.000.

Thorisson, Snorri: *See*—
Barlow, Stuart M.; Gunstone, Frank D.; Hardy, Roy; and Thorisson, Snorri, 4,986,996, Cl. 426-545.000.

Thorn, John S.: *See*—
Sood, Pradeep K.; and Thorn, John S., 4,986,092, Cl. 68-12.00R.

Thornton, Pamela M.: *See*—
Burney, Bryan T.; Griffith, Steven L.; Fry, Francis J.; Jang, Yue-Teh; Thornton, Pamela M.; and Liebmann, Vern L., 4,986,814, Cl. 604-164.000.

Thornton, Robert L., to Xerox Corporation. Lateral heterojunction bipolar transistor (LHBT) and suitability thereof as a hetero transverse junction (HTJ) laser. 4,987,468, Cl. 357-34.000.

Thouron, Rene : *See*—
Denis, Jean-Francois; and Thouron, Rene , 4,986,188, Cl. 102-493.000.

Thunberg, Jon C., to W. R. Grace & Co.-Conn. Recovery of glycine and glauber's salt from waste crystal liquors. 4,986,976, Cl. 423-551.000.

Thurston, Debra: *See*—
Slocum, Alexander H.; and Thurston, Debra, 4,987,526, Cl. 364-167.010.

Tiefenthaler, Edelbert, to Sulzer Brothers Limited. Servo piston valve. 4,986,512, Cl. 251-33.000.

Tipton, Kenneth L. Multi-stage motorcycle slider clutch. 4,986,403, Cl. 192-70.110.

Tischer, James C., to American Standard Inc. Incremental electrically actuated valve. 4,986,085, Cl. 62-225.000.

Titmas, James A.; and Flauto, Phillip J. Method of maintaining the average overall sharpness of the blades in a shredding device and apparatus. 4,985,976, Cl. 29-402.080.

Titterton, Paul J.: *See*—
Sweeney, Harold E.; Titterton, Paul J.; and Leonard, Donald A., 4,986,655, Cl. 356-73.000.
Sweeney, Harold E.; Titterton, Paul J.; and Leonard, Donald A., 4,986,656, Cl. 356-73.000.

Tiwari, Sandip: *See*—
Batey, John; Tiwari, Sandip; and Wright, Steven L., 4,987,095, Cl. 437-106.000.

TMC Corporation: *See*—
Freisinger, Henry; Wurther, Hubert; Stritzl, Karl; and Brunhuber, Egon, 4,986,562, Cl. 280-633.000.

Tobias, Samuel; and Messinger, Robert M., to Hayward Industries, Inc. Two-stage adjustable hydrotherapeutic jet and method. 4,985,943, Cl. 4-542.000.

Tobin, Philip J.: *See*—
Nguyen, Bich-Yen; Lee, Jen-Jiang; Nguyen, Hoang K.; Limb, Young; and Tobin, Philip J., 4,987,102, Cl. 437-238.000.

Tochihara, Shinichi: *See*—
Iwata, Kazuo; Tochihara, Shinichi; and Koike, Shoji, 4,986,850, Cl. 106-25.000.

Tocker, Stanley, to Du Pont de Nemours, E. I., and Company. Fungicide compositions. 4,987,142, Cl. 514-383.000.

Tockert, Christian, to Centre National D'Etudes Spatiales (C.N.E.S.). Process of stabilizing at altitude a stratoshperic balloon, and balloon adapted for carrying out the process. 4,986,494, Cl. 244-96.000.

Todd, Russell W.: *See*—
Wertz, Thomas J.; Todd, Russell W.; and Abell, Gerald D., 4,986,839, Cl. 55-274.000.

Toide, Eiichi: *See*—
Shikama, Shinsuke; Toide, Eiichi; Kondou, Mitsushige; and Iwata, Kazuo, 4,987,566, Cl. 369-122.000.

Tokizawa, Minoru: *See*—
Kanamaru, Yoshihiko; Tokizawa, Minoru; Matsumoto, Masaru; Asaoka, Takemitsu; Matsuda, Hideaki; and Kuraishi, Tadayuki, 4,987,144, Cl. 514-383.000.

Toko, Inc.: *See*—
Kasahara, Takeshi, 4,987,459, Cl. 357-14.000.

Tokuda, Hiroatsu: *See*—
Sekine, Yoshihito; Arai, Nobukatsu; Osawa, Tadao; Tokuda, Hiroatsu; Usui, Toshifumi; and Tsutsui, Mitsukuni, 4,986,115, Cl. 73-118.200.

Tokushige, Kensaku: *See*—
Nakamura, Katsuyuki; Yamazaki, Satoru; Kato, Jinichiro; and Tokushige, Kensaku, 4,987,257, Cl. 564-153.000.

Tokyo Automatic Machinery Works, Ltd.: *See*—
Kumata, Kabsuhiko; Endo, Isao; and Tachikawa, Hitoshi, 4,986,718, Cl. 414-421.000.

Tokyo Electron Limited: *See*—
Asakawa, Teruo, 4,986,715, Cl. 414-331.000.

Tomabechi, Hideo: *See*—
Takase, Tsugiko; Adachi, Hideo; Okada, Takao; Shimazu, Hisanari; and Tomabechi, Hideo, 4,987,303, Cl. 250-306.000.

Tomaru, Keiichi, to Sanden Corporation. Refrigerant charging system in which a refrigerant is freshened and smoothly charged into a storage container. 4,986,082, Cl. 62-149.000.

Tombolato, Aldo L.: *See*—
Evans, Neil L.; Tombolato, Aldo L.; Reynolds, Robert R.; and Meisner, Robert J., 4,986,056, Cl. 53-539.000.

tominaga, Akira: *See*—
Shibata, Terukazu; tominaga, Akira; and Hiraki, Tadayoshi, 4,987,178, Cl. 524-547.000.

Tomioka, Kenichi: *See*—
Mase, Toshiyasu; Hara, Hiromu; Nagaoka, Hitoahi; Takahashi, Takumi; Suzuki, Takeshi; Tomioka, Kenichi; and Yamada, Toshimitsu, 4,987,132, Cl. 514-252.000.

Tomisawa, Yoshiaki; Satou, Tadaji; Hayashi, Nobuyuki; and Miyamae, Yusuke, to Hitachi Chemical Co., Ltd. Method employing input and output staging chamber devices for reduced pressure lamination. 4,986,869, Cl. 156-250.000.

Tomita, Masahiro: *See*—
Mochimaru, Hideaki; Komada, Kenya; Tomita, Masahiro; and Kasahara, Rikio, 4,987,446, Cl. 355-200.000.

Tomomatsu, Ryuzo: *See*—
Nomura, Manabu; Tomomatsu, Ryuzo; and Kihara, Kazuaki, 4,987,173, Cl. 524-423.000.

Tomoshige, Toru: *See*—
Kan, Kojiro; Tomoshige, Toru; and Aoki, Hideya, 4,987,214, Cl. 528-317.000.

Tonen Corporation: *See*—
Kobayashi, Taiji; Hosogai, Daijiro; Tsurutani, Kazushi; Higashimoto, Noboru; and Kokubo, Kakuro, 4,986,248, Cl. 123-590.000.

Tong Yang Nylon Co., Ltd: *See*—
An, Tae W.; Jung, Jong K.; Yoo, Yung C.; Lee, Pil H.; and Son, Tae W., 4,987,208, Cl. 528-272.000.

Tong Yang Polyester Co., Ltd.: *See*—
An, Tae W.; Jung, Jong K.; Yoo, Yung C.; Lee, Pil H.; and Son, Tae W., 4,987,208, Cl. 528-272.000.

Tonolla, Robert: *See*—
Saur, Wolfgang; Tonolla, Robert; Taschke, Franz; and Staemmele, Siegfried, 4,986,443, Cl. 222-1.000.

Toohey, William J., to Eastman Kodak Company. Processing circuit for image sensor. 4,987,321, Cl. 307-520.000.

Toray Industries, Inc.: *See*—
Saito, Isoo; Sato, Takuji; Kubota, Koichi; and Yamamoto, Masaharu, 4,987,030, Cl. 428-373.000.
Tsunekawa, Tetsuya; Gotoh, Tetsuya; and Egawa, Keiichi, 4,987,255, Cl. 564-119.000.

Torihata, Takashi; and Nisimura, Satoyuki, to Mitsui Petrochemical Industries, Ltd. Method of removing mercury from hydrocarbon oils. 4,986,898, Cl. 208-251.00R.

Torii, Kunio: *See*—
Masaki, Hisanori; Torii, Kunio; and Suda, Tomio, 4,987,123, Cl. 514-19.000.

Torii, Shumpeita: *See*—
Tamura, Kaoru; and Torii, Shumpeita, 4,987,308, Cl. 250-484.100.

Torrington Company, The: *See*—
Santos, A. John; and Brauer, Michael C., 4,987,415, Cl. 341-15.000.

Toshiba Ceramics Co., Ltd.: *See*—
Ishii, Toshitsuga; Imai, Isao; Sano, Akira; and Sueyoshi, Kouichi, 4,986,972, Cl. 423-344.000.
Ohto, Takashi; Tanaka, Takashi; and Sato, Makoto, 4,987,016, Cl. 428-34.100.

Toshima, Hiroaki: *See*—
Sakamoto, Masakatu; Yaguchi, Youichi; Toshima, Hiroaki; and Kotaki, Toshiroh, 4,987,002, Cl. 427-34.000.

Total Compagnie Francais des Petroles: *See*—
Czernichow, Jean, 4,986,350, Cl. 166-65.100.

Toth, Peter: *See*—
Pera, Ferenc; Szentai, Gyorgy; Kesseru, Zsolt; Toth, Peter; and Kapolyi, Laszlo , 4,986,696, Cl. 405-36.000.

Touma, Kiyoshi; and Shimamura, Takashi, to Copal Company Limited. Compact camera with apparatus size adjustment by zooming. 4,987,435, Cl. 354-195.110.

Towa Seiko Kabushiki Kaisha: *See*—
Kawada, Toshikazu, 4,986,874, Cl. 156-577.000.

Tower, John R.: *See*—
Kinnard, Kenneth P.; Strong, Richard T., Jr.; Goldfarb, Samuel; and Tower, John R., 4,987,295, Cl. 250-208.100.

Toyo Boseki Kabushiki Kaisha: *See*—
Imahashi, Satoshi; Saito, Atsushi; and Yamashita, Katuhiro, 4,987,056, Cl. 430-281.000.
Ishimaru, Katsutoshi; Shimada, Akira; Teshima, Shinichi; and Hayashi, Yuzo, 4,987,067, Cl. 435-22.000.

Toyo Tire & Rubber Co., Ltd.: *See*—
Takahira, Koji, 4,986,327, Cl. 152-556.000.

Toyoda Gosei Co., Ltd.: *See*—
Murachi, Tatsuya, 4,987,204, Cl. 528-59.000.
Shigeki, Kiyoshi; and Nozaki, Masahiro, 4,986,947, Cl. 264-250.000.

Toyota Jidosha kabushiki Kaisha: *See*—
Abe, Kazuo, 4,986,070, Cl. 60-285.000.
Kushibe, Takahiro; Takano, Yuichi; Tateno, Manabu; Ohno, Eishi; and Shirabe, Naotaka, 4,986,247, Cl. 123-533.000.
Mori, Eiji; Sonoda, Hidefumi; Hiraku, Akira; Minezawa, Morio; Kato, Isao; and Ito, Koichi, 4,986,840, Cl. 55-316.000.
Nishii, Michiharu; Mizuno, Genji; Nomura, Yoshihisa; Kato, Masahiko; Shirai, Kenji; and Tanoue, Junichi, 4,986,613, Cl. 303-114.000.

Toyota Jidosha Kabushiki Kaisha & Aisin Seiki Co., Ltd.: *See*—
Yamauchi, Takatsugu; and Ito, Kouichi, 4,986,598, Cl. 296-217.000.

Tozune, Sigeru; Yamazaki, Shizuo; Komori, Ryuichi; Ishii, Masashi; Sakaguchi, Yoshio; and Oda, Tetsuya, to Achilles Corporation; and Honda Giken Kogyo Kabushiki Kaisha. Shock-absorbing polyurethane foam and production process thereof. 4,987,156, Cl. 521-99.000.

Trabacchi, Franco: *See*—
Grigoli, Franco; and Trabacchi, Franco, 4,986,080, Cl. 62-75.000.

Tran, Van Tuan, to Daimler-Benz AG. Arrangement for determining the effects of cross winds on vehicles. 4,987,542, Cl. 364-424.050.

Tranquilla, Michael N., to Unisys Corp. Film supply and threading mechanism. 4,986,490, Cl. 242-179.000.

Travanty, Frank C.; Allen, Philip M.; and Chopra, Vinod K., to General Electric Company. Automatic backout control for a motorized positioning X-ray apparatus. 4,987,583, Cl. 378-91.000.

Traxler, Mark T.: *See*—
Dye, Clifford L.; Greenwood, Leon D.; Traxler, Mark T.; and Noren, Lawrence J., III, 4,986,675, Cl. 384-192.000.

Treiber, Helmut: *See*—
Benker, Gerhard; Nitsch, Wilhelm; Payrhammer, Bernd; Weinert, Volker; Treiber, Helmut; and Kluter, Ulrich, 4,987,440, Cl. 355-41.000.

Trell, Anders E. Entrance telephone system utilizing the public subscriber telephone network. 4,987,589, Cl. 379-10.300.

Treyz, Willy: *See*—
Ohlendorf, Rolf; Treyz, Willy; and Speier, Wolfgang, 4,986,801, Cl. 475-331.000.

Triangle Brass Manufacturing Company: *See*—
Campbell, Andrew B.; and Simon, Ira J., 4,986,583, Cl. 292-336.300.

Tribastone, Salvatore: *See*—
Jacono, Carmelo; and Tribastone, Salvatore, 4,987,166, Cl. 524-68.000.

Trigg, Mark B., to Commonwealth Scientific & Industrial Research Organization. Method of forming a ceramic product. 4,987,104, Cl. 501-92.000.

Trimble, Brent J. Method of making composite bicycle frames. 4,986,949, Cl. 264-258.000.

Troke, Jeffery: *See*—
Schonafinger, Karl; Beyerle, Rudi; Schindler, Ursula; Jablonka, Bernd; and Troke, Jeffery, 4,987,134, Cl. 514-252.000.

Trosch, Walter; Kiefer, Werner; Lohmann, Karlheinz; and Durolf, Hans, to Schott Glaswerke. Porous inorganic support spheres which can be cleaned of surface biomass under fluidized bed conditions. 4,987,068, Cl. 435-41.000.

Troster, Manfred: *See*—
Hofmann, Heinrich; and Troster, Manfred, 4,986,607, Cl. 301-124.00R.

Trott, Arthur F.: *See*—
Bays, F. Barry; and Trott, Arthur F., 4,986,825, Cl. 604-22.000.

Trow, Jay: *See*—
Stults, Robert A.; Harrison, Steven R.; Merrow, Thomas E.; Laursen, Jane J.; Goodman, George O.; Trow, Jay; and Abel, Mark J., 4,987,492, Cl. 358-181.000.

Trowitzsch-Kienast, Wolfram: *See*—
Reichenbach, Hans; Hofle, Gerhard; Augustiniak, Hermann; Bedorf, Norbert; Gerth, Klaus; Irschik, Herbert; Jansen, Rolf; Kunze, Brigitte; Schomburg, Dietmar; Steinmetz, Heinrich; Trowitzsch-Kienast, Wolfram; and Wray, Victor, 4,987,072, Cl. 435-119.000.

Truong Dinh, Nguyen: *See*—
Germanaud, Laurent; Truong Dinh, Nguyen; Marie, Gilbert; and Turello, Patrick, 4,986,924, Cl. 252-51.50A.

TRW Inc.: *See*—
Drutchas, Gilbert H., deceased, 4,986,689, Cl. 403-127.000.

Tserng, Hua Q.: *See*—
Kim, Bumman; and Tserng, Hua Q., 4,987,462, Cl. 357-22.000.

Tsubota, Hiroki: *See*—
Ohnishi, Kazuhiko; Miki, Shoji; Fujita, Yasuo; Tsubota, Hiroki; and Uosaki, Katsuji, 4,987,603, Cl. 382-25.000.

Tsuburai, Yasuhiko: *See*—
Nitta, Koichi; Nishikawa, Yukie; Ishikawa, Masayuki; Tsuburai, Yasuhiko; and Kokubun, Yoshihiro, 4,987,097, Cl. 437-129.000.

Tsuchiya, Makio: *See*—
Sunahara, Yonehiko; Matsunaga, Makoto; Mano, Seiji; Ohmine, Hiroyuki; and Tsuchiya, Makio, 4,987,421, Cl. 343-700.0MS.

Tsuchiya, Mitsunori: *See*—
Yamazaki, Shunpei; Tsuchiya, Mitsunori; Kawano, Atsushi; Imatou, Shinji; Nakashita, Kazuhisa; Hamatani, Toshiji; Inushima, Takashi; and Itou, Kenji, 4,987,004, Cl. 427-38.000.

Tsuda, Hisanori: *See*—
Takasu, Katsuji; Sano, Masafumi; Tsuda, Hisanori; and Hirai, Yutaka, 4,987,460, Cl. 357-17.000.

Tsuji, Sadafusa: *See*—
Yamanishi, Akio; Kamezawa, Hitoshi; Sakai, Takao; Tsuji, Sadafusa; and Ota, Mitsunobu, 4,986,665, Cl. 356-402.000.

Tsujimoto, Kazunori: *See*—
Tachi, Shinichi; Tsujimoto, Kazunori; and Okudaira, Sadayuki, 4,986,877, Cl. 156-643.000.

Tsukabayashi, Kazuo: *See*—
Morohashi, Kazuo; Kawasaki, Masayoshi; Tsukabayashi, Kazuo; and Hamade, Saburo, 4,986,316, Cl. 139-452.000.

Tsukagoshi, Kazuo, to Mitsubishi Denki Kabushiki Kaisha. Projection television set. 4,987,483, Cl. 358-64.000.

Tsukamoto, Koichi: *See*—
Uchiyama, Futoshi; Agatsuma, Ko; Ohara, Takeshi; Tsukamoto, Koichi; Ishigami, Sumiyuki; Sato, Mitsuru; and Sugimoto, Hisashi, 4,986,670, Cl. 374-117.000.

Tsumura & Co.: *See*—
Matsuoko, Yoshiyuki; Hosaka, Kunio; Takeda, Shigefumi; and Mitsuhashi, Hiroshi, 4,987,240, Cl. 549-436.000.

Tsunekawa, Tetsuya; Gotoh, Tetsuya; and Egawa, Keiichi, to Toray Industries, Inc. Organic nonlinear optical material. 4,987,255, Cl. 564-119.000.

Tsuno, Masahiro: *See*—
Iwasaki, Jyuzaemon; Nakano, Hideharu; Tsuno, Masahiro; and Nakamura, Zenichi, 4,985,999, Cl. 30-206.000.

Tsuruoka, Ichiro: *See*—
Mochizuki, Manabu; Kurotori, Tsuneo; Tsuruoka, Ichiro; Echigo, Katsuhiro; Takenouchi, Hiroaki; and Soga, Setsuo, 4,987,457, Cl. 355-285.000.

Tsurutani, Kazushi: *See*—
Kobayashi, Taiji; Hosogai, Daijiro; Tsurutani, Kazushi; Higashimoto, Noboru; and Kokubo, Kakuro, 4,986,248, Cl. 123-590.000.

Tsushima, Susumu; Takatani, Muneo; and Hirata, Minoru, to Takeda Chemical Industries, Ltd. Substituted amine derivatives, their production and use. 4,987,130, Cl. 514-210.000.

Tsutsui, Mitsukuni: *See*—
Sekine, Yoshihito; Arai, Nobukatsu; Osawa, Tadao; Tokuda, Hiroatsu; Usui, Toshifumi; and Tsutsui, Mitsukuni, 4,986,115, Cl. 73-118.200.

Tsutsumi, Hisao: *See*—
Fukasawa, Junichi; Shirakawa, Noriko; and Tsutsumi, Hisao, 4,987,241, Cl. 556-174.000.

Tsutsumi, Jyoji, to Alps Electric Co., Ltd. Push-button switch. 4,987,278, Cl. 200-294.000.

Tuan, C. T.; and Tuan, Yuan-Ling. Structure of ball and socket joint for a vehicle steering control system. 4,986,688, Cl. 403-127.000.

Tuan, Yuan-Ling: *See*—
Tuan, C. T.; and Tuan, Yuan-Ling, 4,986,688, Cl. 403-127.000.

Tubauto: *See*—
Blanchard, Jean-Marie, 4,986,602, Cl. 297-362.000.

Tuma, Martin, to ITM Industrial Technology & Machines AG; and Sphinxwerker Muller AG. Slide arresting device at a handgun. 4,986,163, Cl. 89-196.000.

Turello, Patrick: *See*—
Germanaud, Laurent; Truong Dinh, Nguyen; Marie, Gilbert; and Turello, Patrick, 4,986,924, Cl. 252-51.50A.

Turturro, Antonio: *See*—
Ruso, Saverio; Alfonso, Giovanni C.; Pedemonte, Enrico; Turturro, Antonio; and Martuscelli, Ezio, 4,987,189, Cl. 525-183.000.

Twerdochlib, Michael, to Westinghouse Electric Corp. Turbine blade shroud clearance monitor. 4,987,555, Cl. 364-561.000.

Ube Industries, Ltd.: *See*—
Kaneko, Noriaki; Hirata, Yoshimi; and Moriwaki, Masahiro, 4,986,832, Cl. 623-1.000.

Uchida, Naoya: *See*—
Hida, Junichi; Uchida, Naoya; and Tatematsu, Susumu, 4,986,081, Cl. 62-130.000.

Uchino, Nobuhiko: *See*—
Terai, Fumitaka; Yamagami, Hiroyuki; Uchino, Nobuhiko; and Okazaki, Masaki, 4,987,062, Cl. 430-546.000.

Uchiyama, Futoshi; Agatsuma, Ko; Ohara, Takeshi; Tsukamoto, Koichi; Ishigami, Sumiyuki; Sato, Mitsuru; and Sugimoto, Hisashi, to Agency of Industrial Science & Technology, Ministry of International Trade & Tokyo Denpa Co., Ltd. Temperature measurement device. 4,986,670, Cl. 374-117.000.

Uchiyama, Takako: *See*—
Ebata, Shuji; Hirayama, Hiroyuki; and Uchiyama, Takako, 4,987,256, Cl. 564-126.000.

Udipi, Kishore; and Padwa, Allen R., to Monsanto Company. Polyblends of thermoplastic copolyesters and styrene acrylonitrile copolymers. 4,987,187, Cl. 525-173.000.

Ueda, Kanji: *See*—
Uno, Masaru; Ueda, Kanji; Inoue, Masahiro; and Kaji, Shinichi, 4,986,835, Cl. 55-26.000.

Ueda, Masahiko: *See*—
Moriya, Takashi; Ueda, Masahiko; and Endo, Toshihiro, 4,986,179, Cl. 101-93.040.

Ueda, Yasuhiro: *See*—
Gotanda, Masakazu; and Ueda, Yasuhiro, 4,987,314, Cl. 250-551.000.

Uehara, Keiji, to Teac Corporation. Clamping mechanism for clamping a movable carriage carrying a recording/reproducing head of an information recording/reproducing apparatus. 4,987,506, Cl. 360-105.000.

Uekita, Masakazu; and Awaji, Hiroshi, to Kanegafuchi Kagaku Kogyo Kabushiki Kaisha. Copolymeric and amphiphilic polyimide precursor, process for preparing the same and thin film. 4,987,219, Cl. 528-353.000.

Uemori, Satoshi, to Mita Industrial Co., Ltd. Wiring device. 4,987,442, Cl. 355-50.000.

Uemura, Masakazu; Hirano, Yoshinori; and Shimonosono, Hitoshi, to Nissan Motor Co., Ltd. Rotary heat exchanger. 4,986,345, Cl. 165-86.000.

Ueno, Keisuke, to Ueno, Keisuke; United Board Co., Ltd.; and K. S. Consult Service Co., Inc. Non-inflammable light-weighing tough board. 4,987,022, Cl. 428-182.000.

Ugai, Seiichi: *See*—
Shimada, Satoshi; Ugai, Seiichi; Sase, Akira; and Shimizu, Yasuhi, 4,986,127, Cl. 73-714.000.

Ukai, Toshinao: *See*—
Saitou, Mitsuo; Ukai, Toshinao; and Ikeda, Tadashi, 4,987,064, Cl. 430-570.000.
Ukita, Teruhiko, to Kabushiki Kaisha Toshiba. Knowledge-guided automatic speech recognition apparatus and method. 4,987,596, Cl. 381-41.000.
Ullrich, Volker: *See*—
Hahnewald, Andrea; Mothrath, Georg; Schamberg, Stefan; and Ullrich, Volker, 4,986,173, Cl. 99-338.000.
Ultradent Products, Inc.: *See*—
Fischer, Dan E., 4,986,820, Cl. 604-218.000.
Umada, Youichi: *See*—
Sirosita, Masao; Mizutani, Masato; Kimura, Shigeko; Oguri, Yukio; Kitamura, Masaru; Umada, Youichi; and Sato, Hiroshi, 4,986,989, Cl. 424-635.000.
Umemura, Kazuo: *See*—
Takagi, Kazuhiko; Sonoda, Rikuo; and Umemura, Kazuo, 4,986,525, Cl. 271-114.000.
Umezaki, Tomokazu, to Mitsubishi Denki Kabushiki Kaisha. Ignition coil for internal combustion engine. 4,985,984, Cl. 29-602.100.
Umino, Mitsugu; and Nakayama, Kiyoshi, to Yoshida Kogyo K.K. Apparatus for dyeing or otherwise treating an elongate fabric material. 4,986,094, Cl. 68-27.000.
Underwood, John P.; and Poole, Dan B. Planting apparatus. 4,986,368, Cl. 172-394.000.
Unidynamics Corporation: *See*—
Austin, John S.; and Gruenberg, Jeff D., 4,985,975, Cl. 29-283.500.
Union Camp Corporation: *See*—
Frihart, Charles R.; and Wroczynski, Ronald J., 4,987,160, Cl. 522-164.000.
Union Carbide Chemicals and Plastics Company Inc.: *See*—
Keogh, Michael J., 4,987,190, Cl. 525-193.000.
Union Oil Company of California: *See*—
McGee, Dennis E.; and Hallen, Ted S., 4,987,250, Cl. 562-118.000.
Mueller, Mark D.; Jones, Frank; Quintana, Julio; Ruddy, Kenneth E.; and Mims, Michael, 4,986,361, Cl. 166-381.000.
Scherzer, Julius, 4,987,110, Cl. 502-68.000.
Uniroyal Goodrich Tire Company, The: *See*—
Pottinger, Marion G., 4,986,118, Cl. 73-146.000.
Uniroyal Plastics Co., Inc.: *See*—
Jacobs, Martin I.; Schrock, Fredric L.; and Derse, David P., 4,987,026, Cl. 428-246.000.
Unisys Corporation: *See*—
Braun, Robert E.; and Gibbs, Ronald T., 4,987,478, Cl. 357-81.000.
Tranquilla, Michael N., 4,986,490, Cl. 242-179.000.
United Board Co., Ltd.: *See*—
Ueno, Keisuke, 4,987,022, Cl. 428-182.000.
United Kingdom of Great Britain and Northern Ireland, The Secretary of State for Trade and Industry in Her Britannic Majesty's Government of the: *See*—
Rowley, William R. C.; and Gill, Patrick, 4,987,574, Cl. 372-28.000.
United States of America
Air Force: *See*—
Baciak, Mark G., 4,987,293, Cl. 250-206.100.
Air Froce: *See*—
Spry, Robert J., 4,986,635, Cl. 350-311.000.
Army: *See*—
Bienert, Walter B.; Jopson, Edward J.; and Lanza, Richard J., 4,986,253, Cl. 126-21.00A.
Freeman, Charles F., 4,987,494, Cl. 358-213.110.
Zeto, Robert J.; Hryckowian, Eugene, deceased; Morton, David C.; Costello, John A.; and Conrad, John C., 4,986,876, Cl. 156-643.000.
United States of America as represented by the Administrator of the National Aeronautics and Space Administration, The: *See*—
Calomino, Anthony M., 4,986,132, Cl. 73-852.000.
United States of America as represented by the United States National Aeronautics and Space Administration, The: *See*—
Robertson, James B., 4,987,339, Cl. 313-502.000.
Energy: *See*—
Hardee, Harry C., 4,986,307, Cl. 137-625.190.
Vaitekunas, Jeffrey J.; and Roberts, Ronald A., 4,987,412, Cl. 340-721.000.
Health and Human Services: *See*—
Cohen, Jack S.; Chen, Chi-Wan; Myers, Charles E.; and Sohn, Miriam, 4,986,256, Cl. 128-653.400.
Hampl, Vladimir; and Johnston, Ova E., 4,986,703, Cl. 409-131.000.
National Aeronautics and Space Administration: *See*—
Riccitiello, Salvatore R.; Hsu, Ming-ta S.; and Chen, Timothy S., 4,987,201, Cl. 528-4.000.
Navy: *See*—
Athale, Ravindra A., 4,986,640, Cl. 350-358.000.
Gilbreath, G. Charmaine; and Davidson, Frederic M., 4,987,607, Cl. 455-618.000.
Gray, Henry F.; and Greene, Richard F., 4,987,377, Cl. 330-54.000.
Johnson, James K., 4,986,755, Cl. 434-008.000.
Kuhnle, William G.; and Murnane, James F., II, 4,986,185, Cl. 102-388.000.
Moore, Martin E.; and Bennett, Robert R., 4,986,708, Cl. 411-20.000.
U.S. Philips Corporation: *See*—
Bongenaar, Hendrik; and van der Avoort, Henricus J. M., 4,987,337, Cl. 313-406.000.
Braat, Josephus J. M., 4,986,641, Cl. 350-432.000.
Hughes, John B., 4,987,379, Cl. 330-253.000.
Leusaler, Christoph G.; and Wilchern, Andreas H. W., 4,987,370, Cl. 324-318.000.
L'Hermite, Pierre; Vergne, Michel; and Escapoulade, Alain, 4,987,336, Cl. 313-105.00R.
Ludikhuize, Adrianus W., 4,987,469, Cl. 357-35.000.
Pelgrom, Marcellinus J. M.; Jochijms, Antonius J. G.; and Van Roermund, Arthur H. M., 4,987,580, Cl. 377-60.000.
Rots, Johannes A. M., 4,987,520, Cl. 361-521.000.
Severijns, Adrianus P.; Severin, Petrus J. W.; and Van Bommel, Cornelus H. M., 4,986,620, Cl. 350-96.150.
Slob, Arie, 4,987,558, Cl. 365-183.000.
Stormberg, Hans-Peter; Watanabe, Yoshio; and Ochiai, Isao, 4,987,345, Cl. 315-111.210.
Van Stapele, Reurt P.; Heerschap, Arend; and Den Hollander, Jan A., 4,987,369, Cl. 324-307.000.
Wassink, Derk J. C., 4,987,594, Cl. 380-6.000.
United Technologies Corporation: *See*—
DoCarmo, Chris, 4,986,003, Cl. 33-502.000.
Kosowsky, Lester H.; and Kubick, Frederick, 4,987,418, Cl. 342-6.000.
Universal Tool & Stamping Co., Inc.: *See*—
Scoville, John R.; and Engel, Darryl L., 4,986,802, Cl. 475-346.000.
University of Delaware: *See*—
McConkey, Laura P., 4,986,617, Cl. 312-237.000.
University of Florida: *See*—
Bergeron, Raymond J., 4,987,253, Cl. 562-623.000.
University of Georgia Research Foundation, Inc.: *See*—
Chu, Chung K., 4,987,224, Cl. 536-23.000.
University of Iowa Research Foundation: *See*—
Allen, Susan D., 4,987,286, Cl. 219-121.680.
University of New Mexico, The: *See*—
Brueck, Steven R. J.; Soares, Schubert; McArdle, Kristin; and Mullins, Bill W., 4,987,461, Cl. 357-19.000.
Wilkins, Ebtisam S., 4,986,271, Cl. 128-635.000.
University of St. Andrews: *See*—
Barlow, Stuart M.; Gunstone, Frank D.; Hardy, Roy; and Thorisson, Snorri, 4,986,996, Cl. 426-545.000.
University of Virginia: *See*—
Baertschi, Alex J.; and Niskanen, Eero, 4,987,121, Cl. 514-8.000.
University Patents, Inc.: *See*—
Cech, Thomas R.; Zaug, Arthur J.; and Been, Michael D., 4,987,071, Cl. 435-91.000.
Unno, Tomoyuki: *See*—
Murata, Masayuki; Katsuta, Shinichiro; and Unno, Tomoyuki, 4,987,118, Cl. 503-200.000.
Uno, Masaru; Ueda, Kanji; Inoue, Masahiro; and Kaji, Shinichi, to Seitetsu Kagaku Co., Ltd. Process for separating and recovering carbonic acid gas from gas mixture by adsorption. 4,986,835, Cl. 55-26.000.
Uosaki, Katsuji: *See*—
Ohnishi, Kazuhiko; Miki, Shoji; Fujita, Yasuo; Tsubota, Hiroki; and Uosaki, Katsuji, 4,987,603, Cl. 382-25.000.
Urata, Kazuo: *See*—
Yamazaki, Shunpei; Urata, Kazuo; Tashiro, Mamoru; Tanamura, Yuji; and Imato, Shinji, 4,987,008, Cl. 427-53.100.
Urban, Manfred: *See*—
Dietz, Erwin; Kapaun, Gustav; Kappert, Michael; Prokschy, Frank; Kroh, Adolf; and Urban, Manfred, 4,986,852, Cl. 106-498.000.
Urlaub, Herbert: *See*—
Bugar, Robert; Chakraborty, Asok; and Urlaub, Herbert, 4,986,904, Cl. 210-94.000.
Ushijima, Ryosuke; Nakagawa, Susumu; and Mano, Eiichi, to Banyu Pharmaceutical Co., Ltd. Isoindoline derivatives and processes for their preparation. 4,987,235, Cl. 548-430.000.
Ushiki, Hiroshi: *See*—
Yamazaki, Nobuto; Ushiki, Hiroshi; and Katakubo, Kenji, 4,986,460, Cl. 228-4.500.
Ushikubo, Masao, to Olympus Optical Co., Ltd. Liquid container for use in biochemical analysis. 4,986,965, Cl. 422-102.000.
Usui Kokusai Sangyo Kabushiki Kaisha: *See*—
Hitachi, Yuzo; and Takikawa, Kazunori, 4,987,034, Cl. 428-593.000.
Usui, Toshifumi; and Hohkita, Atsushi, to Hitachi, Ltd.; and Hitachi Automotive Engineering Co., Ltd. Air flow meter for internal combustion engine. 4,986,116, Cl. 73-118.200.
Usui, Toshifumi: *See*—
Sekine, Yoshihito; Arai, Nobukatsu; Osawa, Tadao; Tokuda, Hiroatsu; Usui, Toshifumi; and Tsutsui, Mitsukuni, 4,986,115, Cl. 73-118.200.
Utec B. V.: *See*—
Lilley, Stephen J., 4,986,251, Cl. 124-67.000.
Utsui, Yoshihiko: *See*—
Sato, Hiroshi; Utsui, Yoshihiko; Ikeda, Hideo; and Hamamura, Chiyo, 4,986,137, Cl. 73-862.360.
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Broadwin, Alan; and Emery, Leonard M., 4,986,808, Cl. 604-22.000.
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Masek, Jiri; Futcher, Ralph J.; and Dixon, James R., 4,986,177, Cl. 100-163.00R.
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Klasen, Rene; Schar, Hugo; and Vogt, Heinz, 4,987,309, Cl. 250-492.100.
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Simon, Gerhard, 4,987,041, Cl. 429-59.000.
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Bailey, James C.; Atkinson, Gordon E.; and Boehmer, Dennis A., 4,986,310, Cl. 137-859.000.
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Pera, Ferenc; Szentai, Gyorgy; Kesseru, Zsolt; Toth, Peter; and Kapolyi, Laszlo , 4,986,696, Cl. 405-36.000.
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Vick, Gerald L., to Rockwell International Corporation. Solid state fiber optic semiconductor ring laser apparatus. 4,986,661, Cl. 356-350.000.
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Ashley, Charles R.; Crossman, Russell J.; Hennessy, John P.; and Lahm, William J., 4,986,414, Cl. 206-5.100.
Vives, Michel C.: *See—*
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Voss, Peter, to Siemens Aktiengesellschaft. Process for manufacturing a thyristor with proton irradiation. 4,987,087, Cl. 437-6.000.
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Agnew, Colvin H.; Wade, Weldon O.; and Agnew, Stuart H., 4,986,031, Cl. 49-385.000.
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Wagler, Thomas R.: *See*—
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Walbro Far East, Inc.: *See*—
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Walker, David: *See*—
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Wallace Computer Services, Inc.: *See*—
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Watanabe, Hideo: *See*—
Nakamura, Kiichi; Itakura, Masami; Atsumi, Yasuhiko; Watanabe, Hideo; and Kanagawa, Youiti, 4,987,009, Cl. 427-96.000.

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Watanabe, Junichi: *See*—
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Watanabe, Masashi, to AB Tetra Pak. Method and a device to paste a strip tape onto a packaging web equipped with a liquid pouring hole. 4,986,859, Cl. 156-69.000.

Watanabe, Mineo: *See*—
Maruta, Masamichi; Kaneda, Showzou; Watanabe, Mineo; and Katoh, Etsuko, 4,987,259, Cl. 564-335.000.

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Yagi, Nagatada; Shiraishi, Motoatsu; Kimura, Shizuo; Watano, Yukihisa; Nakamura, Mitsuki; and Shinozawa, Shinji, 4,985,993, Cl. 29-894.353.

Watarai, Shinichi; Houki, Yoji; and Nonomura, Tomohiro, to Fujitsu Limited. Method of separately feeding a print medium sheet and apparatus therefor. 4,986,528, Cl. 271-265.000.

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Waynick, John A., to Amoco Corporation. Front-wheel drive grease with synergistic sulfate and carbonate additive system. 4,986,923, Cl. 252-25.000.

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Eidenschink, Rudolf; Haas, Gunther; Pohl, Ludwig; Romer, Michael; Scheuble, Bernhard; and Weber, Georg, 4,986,931, Cl. 252-299.630.

Weber, Hubert: *See*—
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Weber, John D.: *See*—
Heim, Frederick L.; Becker, Mark; Dullinger, Craig A.; Gnifkowski, Edward J.; Gohl, Roger M.; and Weber, John D., 4,986,864, Cl. 156-201.000.

Weber, Ronald M., to AMP Incorporated. Combination latch-hinge device. 4,985,962, Cl. 16-232.000.

Weber S.r.l.: *See*—
Bonfiglioli, Silverio; and Fato, Massimo, 4,986,242, Cl. 123-479.000.

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Webster, Owen W.: *See*—
Smart, Bruce E.; and Webster, Owen W., 4,987,157, Cl. 521-50.000.

Webster, Timothy: *See*—
Rai, Vish; Dailey, Nils; Southall, Kenneth; Webster, Timothy; Leeke, Gordon; and Chu, Chaokang, 4,986,909, Cl. 210-198.300.

Webway Incorporated: *See*—
Heim, Frederick L.; Becker, Mark; Dullinger, Craig A.; Gnifkowski, Edward J.; Gohl, Roger M.; and Weber, John D., 4,986,864, Cl. 156-201.000.

Wedge Products Inc.: *See*—
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Weeres, Wilhelmus J. M.: *See*—
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Wehr, Thomas L. Glass saw. 4,985,954, Cl. 7-144.000.

Wei, Yen; Jang, Guang-Way; and Chan, chi-Cheung, to Drexel University. Polymerization of thiophene and its derivatives. 4,986,886, Cl. 204-78.000.

Weil, Thomas L., to Davlyn Manufacturing Co., Inc. Gaskets and gasket-like devices with fasteners. 4,986,033, Cl. 49-492.000.

Weinert, Volker: *See*—
Benker, Gerhard; Nitsch, Wilhelm; Payrhammer, Bernd; Weinert, Volker; Treiber, Helmut; and Kluter, Ulrich, 4,987,440, Cl. 355-41.000.

Weise, Hartmut: *See*—
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Weisner, Kent A., to SNE Enterprises, Inc. Operating-vent glass-glazed standing-seam skylight. 4,986,039, Cl. 52-72.000.

Weiss, Mark E.: *See*—
Steiner, Eric L.; Weiss, Mark E.; and Samson, Jeffrey T., 4,986,816, Cl. 604-192.000.

Weissler, Harold E., II; and Shirey, Benjamin G., to Siemens Automotive L.P. Mass air flow engine control system with mass air event integrator. 4,986,243, Cl. 123-488.000.

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van Hemmen, Aldert J. M.; Wempe, Cornelis M. P.; and Balm, Martinus A., 4,986,011, Cl. 37-141.00T.

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Windhosel, Ralf; and Wendler, Michael H., 4,986,488, Cl. 242-118.100.

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Western Medical Consultants: *See*—
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Schron, Dean; Kemeny, George A.; Pavlik, Dennis; and Stefani, Francesco, 4,986,161, Cl. 89-8.000.
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Stock, Alvin L.; and Groenendaal, John C., Jr., 4,986,732, Cl. 415-066.000.
Twerdochlib, Michael, 4,987,555, Cl. 364-561.000.

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Corcoran, Richard A.; and Whinston, James P., 4,986,963, Cl. 422-30.000.

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Pastryk, Jim J.; Cur, Nihat O.; Hardaway, Anthony H.; and Euler, John W., 4,986,093, Cl. 68-13.00R.

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Hill, Amos G., 4,986,062, Cl. 56-16.900.

White, Craig W.; and Musser, Kevin E., to Automotive Systems Laboratory, Inc. Passenger restraint firing circuit. 4,987,316, Cl. 307-10.100.

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Sheaffer, Patrick M.; and White, Jack L., 4,986,943, Cl. 264-29.100.

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Neenan, Thomas X.; and Whitesides, George M., 4,987,209, Cl. 526-243.000.

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Whitright, Curt E. Tubular writing instrument. 4,986,683, Cl. 401-195.000.

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Luke, Walter, Jr., 4,987,540, Cl. 364-424.020.

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Chen, Shieh-Shung T.; Wicker, Linda S.; and Arison, Byron H., 4,987,139, Cl. 514-321.000.

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Sun, Mei H.; and Wickersheim, Kenneth A., 4,986,671, Cl. 374-131.000.

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Hirth, Michael; Jochum, Joachim; and Wieckert, Christian, 4,986,347, Cl. 165-94.000.

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Petzold, Rainer; and Wiencek, Norbert, 4,986,401, Cl. 192-0.032.

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Wilber, Edward: *See*—
Soehner, William; and Wilber, Edward, 4,986,096, Cl. 70-54.000.

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Leussler, Christoph G.; and Wilchern, Andreas H. W., 4,987,370, Cl. 324-318.000.

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Stromath, David K.; and Wiler, Curtiss D., 4,986,495, Cl. 244-117.00A.

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Coffin, Dave, 4,985,995, Cl. 30-84.000.

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Williamson, Ian M.: *See*—
Stackhouse, Wyman H.; and Williamson, Ian M., 4,986,282, Cl. 128-857.000.

Willis, Donald H.: *See*—
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Wilmers, Katrin: *See*—
Contzen, Franz-Peter; and Wilmers, Katrin, 4,986,536, Cl. 350-319.000.

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Wilson, Geoffrey G.: *See*—
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Wimmer, Friedrich: *See*—
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Winter, Erich, to Kellner AG. Refuse collection vehicle. 4,986,716, Cl. 414-409.000.

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Wise, Robert D., to Century Products Company. Baby carrier. 4,986,599, Cl. 297-183.000.

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Yatka, Robert; Prombo, Patrick; Barabolak, Roman M.; Zibell, Steven; and McGrew, Gordon N., 4,986,991, Cl. 426-3.000.

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Miller, Terry L.; Zdanis, William R., Jr.; Woerner, Graham A.; and Horn, Allen F., III, 4,987,274, Cl. 174-102.00R.

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Ayer, Atul D.; Theeuwes, Felix; and Wong, Patrick S. L., 4,986,987, Cl. 424-473.000.

Wong, Stephen L., to North American Philips Corporation. Bilevel current limiter. 4,987,348, Cl. 315-307.000.

Wood, James A.; and Mazur, Richard J., to American Standard Inc. Wheel spin control system. 4,987,543, Cl. 364-426.030.

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Worland, Richard L. Glenoid component for an artificial shoulder joint. 4,986,833, Cl. 623-19.000.

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Wright, Connie. Receptacle for a flexible beverage container. 4,986,435, Cl. 220-85.00H.

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Hackl, Ralph P.; Wright, Frank R.; and Bruynesteyn, Albert, 4,987,081, Cl. 435-262.000.

Wright, Joseph M., to Ford Aerospace Corporation. Carbon/boron nitride release coating. 4,987,105, Cl. 501-96.000.

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Yaklin, Richard O. Trailer wheel pivoting system. 4,986,559, Cl. 280-402.000.

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Yamada, Hiromi; Yoshida, Eiji; and Takahasi, Kenji, to AMP Incorporated. Optical fiber connector with retainer. 4,986,625, Cl. 350-96.200.

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Yao, Yugo, to Neturen Company Limited. Apparatus for continuous-direct-resistance heating of long-length particles. 4,987,281, Cl. 219-50.000.
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Yasuda, Shinichiro; and Inagaki, Yasunori, to Kao Corporation. Toner cartridge. 4,986,450, Cl. 222-169.000.
Yasuhara, Mitsuki; and Matsunaga, Fujihisa, to Mitsui Petrochemical Industries, Ltd. Preparation of anilines. 4,987,260, Cl. 564-402.000.
Yasuhara, Toshihiro; Masuda, Masachika; Nishimura, Asao; Hatada, Naozumi; Kawai, Sueo; Kitano, Makoto; Miura, Hideo; Yaguchi, Akihiro; and Murakami, Gen, to Hitachi, Ltd. Semiconductor device and method of manufacturing the same. 4,987,474, Cl. 357-70.000.
Yasukawa, Takeshi: *See*—
Morishita, Mitsuharu; and Yasukawa, Takeshi, 4,986,381, Cl. 180-79.100.
Yates, Stephen F.; Good, Mary L.; and Brubaker, Inara M., to Allied-Signal Inc. Cellulose acetate bound photosensitizer for producing singlet oxygen. 4,986,921, Cl. 210-758.000.
Yatka, Robert; Prombo, Patrick; Barabolak, Roman M.; Zibell, Steven; and McGrew, Gordon N., to Wm Wrigley, Jr., Company. Chewing gum having an extended sweetness. 4,986,991, Cl. 426-3.000.
Yazaki Corporation: *See*—
Aoki, Kunimitsu; Miyazawa, Yasuhiro; Ichikawa, Hiroshi; and Furuya, Yoshiyuki, 4,986,631, Cl. 350-112.000.
Yetter Manufacturing Company: *See*—
Johnston, Mark, 4,986,200, Cl. 111-135.000.
Yhtyneet Paperitehtaat Oy: *See*—
Taipale, Jyrki; and Sarantola, Jaakko, 4,986,883, Cl. 162-205.000.
Yin-Lung, Yang. Road intersection construction for traffic control. 4,986,692, Cl. 404-1.000.
Ying, Edwina; and Hayes, Conrad G., to Hoechst Celanese Corporation. Low gloss polyacetal resin. 4,987,174, Cl. 524-444.000.
Yoda, Sumio: *See*—
Nowatari, Hiroyoshi; Hayami, Hiroshi; Kuroda, Yasuo; Yoda, Sumio; and Takahashi, Katsutoshi, 4,987,246, Cl. 556-137.000.
Yogo, Kazutoshi: *See*—
Goshima, Takahiro; Yogo, Kazutoshi; Wakata, Hideo; and Kishimoto, Masashi, 4,986,611, Cl. 303-100.000.
Yoguchi, Katsuji: *See*—
Kuragano, Morimasa; Iwasaki, Kozo; Isobe, Takeshi; Fukada, Isao; Koshibe, Minoru; Sezaki, Yoshihiro; Segawa, Hirozo; and Yoguchi, Katsuji, 4,987,252, Cl. 562-600.000.
Yohn, Brent D.: *See*—
Eaby, Daniel G.; Scholz, James P.; Shaffer, David T.; Shatto, Walter C., Jr.; and Yohn, Brent D., 4,986,764, Cl. 439-275.000.
Yokohama Rubber Co., Ltd., The: *See*—
Suzuki, Toshihiko; and Shirai, Kenichi, 4,986,324, Cl. 152-209.00R.
Tajima, Yoshio, 4,987,196, Cl. 525-346.000.
Teramoto, Mitsutake; Saito, Shinkichi; Okumoto, Takaharu; and Asabuki, Hideyo, 4,986,541, Cl. 273-77.00A.
Yokokura, Takashi; Hori, Nobuo; Shimozono, Hiroaki; and Niimura, Satoru, to Kabushiki Kaisha Topcon. Light wave range finder. 4,986,653, Cl. 356-5.000.
Yokota, Akira; Fukuda, Hiroyuki; and Takahashi, Susumu, to Olympus Optical Co., Ltd. Objective lens system for endoscopes and image pickup system equipped with said objective lens system. 4,986,642, Cl. 350-432.000.
Yokoyama, Kenji, to Yamaha Corporation. Acoustic apparatus. 4,987,564, Cl. 367-140.000.
Yonezu, Kazuyoshi: *See*—
Takahashi, Katsuhiro; Yonezu, Kazuyoshi; Yasuda, Hiroshi; Sano, Ichiro; and Kimura, Toshiaki, 4,986,317, Cl. 141-1.100.
Yonker, Donald W., Jr., to National-Standard Company. Gas metal arc welding wire. 4,987,288, Cl. 219-146.100.
Yoo, Ick-Jong; Kim, Kyung-Hwan; and Kim, Young-Eon, to Korea Food Research Institute. Process for manufacturing dehydrated flavoring from livestock blood. 4,986,998, Cl. 426-647.000.
Yoo, Yung C.: *See*—
An, Tae W.; Jung, Jong K.; Yoo, Yung C.; Lee, Pil H.; and Son, Tae W., 4,987,208, Cl. 528-272.000.
Yoon, Heungsik: *See*—
Burrows, Cynthia; Yoon, Heungsik; and Wagler, Thomas R., 4,987,227, Cl. 540-452.000.
Yorita, Tadahiro; and Matsumoto, Haruo, to Murata Manufacturing Co., Ltd. Dielectric filter of solid mold type with frequency adjustment electrodes. 4,987,393, Cl. 333-202.000.
Yoshida, Eiji: *See*—
Yamada, Hiromi; Yoshida, Eiji; and Takahasi, Kenji, 4,986,625, Cl. 350-96.200.
Yoshida, Hiroshi: *See*—
Naito, Takeyuki; Kuroda, Yoshiki; and Yoshida, Hiroshi, 4,986,198, Cl. 110-346.000.
Yoshida, Katsunori: *See*—
Komeno, Minoru; Hirao, Motoaki; Takeuchi, Toshiyuki; Nozoe, Shunpei; Takano, Hideki; and Yoshida, Katsunori, 4,986,199, Cl. 110-347.000.
Yoshida Kogyo K. K.: *See*—
Osaki, Tatsuo, 4,985,977, Cl. 29-408.000.
Yoshida Kogyo, K.K.: *See*—
Terada, Yasuharu; and Ishii, Susumu, 4,985,969, Cl. 24-429.000.
Umino, Mitsugu; and Nakayama, Kiyoshi, 4,986,094, Cl. 68-27.000.
Yoshida, Masahiro: *See*—
Takatsuki, Toyohiko; Yoshida, Masahiro; Sugimoto, Konomu; and Sakaguchi, Ryoichi, 4,986,452, Cl. 222-209.000.
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Yoshida, Tadashi: *See*—
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Yoshida, Toshio. Oscillationless semisubmerged high-speed vessel. 4,986,204, Cl. 114-61.000.

Yoshihara, Takayoshi: *See*—
Hikosaka, Akihiro; Sakai, Hitoshi; Yoshihara, Takayoshi; and Asakura, Naoichi, 4,987,451, Cl. 355-245.000.

Yoshikawa, Junichi: *See*—
Kondo, Hiroatsu; Yoshikawa, Junichi; and Kawanabe, Tetsuya, 4,986,677, Cl. 400-187.000.

Yoshimura, Toshihiko: *See*—
Ishikawa, Yuichi; Yoshimura, Toshihiko; Shimizu, Tasuku; Otaka, Masahiro; and Takaku, Kazuo, 4,987,367, Cl. 324-227.000.

Yoshimura, Tsuyoshi, to Ricoh Company, Ltd. Image editing method for a digital copier. 4,987,497, Cl. 358-452.000.

Yoshimura, Yoshinari; and Murata, Ikuo, to Kabushiki Kaisha Daikin Seisakusho. Manufacturing method for diaphragm spring. 4,985,973, Cl. 29-173.000.

Yoshinaka, Yasuhiro; and Muramoto, Yutaka, to Terumo Kabushiki Kaisha. Electronic clinical thermometer. 4,987,579, Cl. 377-25.000.

Yoshini, Masahiko: *See*—
Masuda, Sadakazu; Fujita, Fumio; Kamata, Masamoto; Yoshini, Masahiko; Ariizumi, Takashi; Okami, Yuji; Takada, Yoshikazu; and Inagaki, Junichi, 4,986,341, Cl. 164-477.000.

Yoshinuma, Mikio: *See*—
Itoh, Kenichiro; Yamada, Takeshi; Onodera, Tsutomu; Yoshinuma, Mikio; and Kato, Yasuyuki, 4,986,843, Cl. 65-152.000.

Yoshioka, Kenji, to Alps Electric Co., Ltd. Lead wire mounting structure for electroluminescence. 4,987,340, Cl. 313-512.000.

Yoshitomi Pharmaceutical Industries, Ltd.: *See*—
Hidaka, Yasuhiro; Magami, Masato; Inoue, Takeshi; and Nakane, Sumio, 4,987,148, Cl. 514-441.000.
Ishimaru, Katsutoshi; Shimada, Akira; Teshima, Shinichi; and Hayashi, Yuzo, 4,987,067, Cl. 435-22.000.

Yoshizu, Fumitsugu; and Sato, Kazuhiko, to Diesel Kiki Co., Ltd. Method for detecting fuel injection performance of fuel injection valve. 4,986,117, Cl. 73-119.00A.

Yost, Marvin E.: *See*—
Cantu, Lisa A.; and Yost, Marvin E., 4,986,354, Cl. 166-279.000.

Young, Harold R.; McSpadden, John S.; McMordie, James R.; and Smith, Leon B., to Gilbarco Inc. Gasoline dispenser with valve control through an air gap. 4,986,445, Cl. 222-71.000.

Yuchi, Takahiro: *See*—
Kaite, Osamu; Yuchi, Takahiro; and Murashima, Hirotsugu, 4,987,491, Cl. 358-166.000.

Yui, Yasuji; and Shirakura, Akira, to Sony Corporation. Imaging sheet roll containing photosensitive microcapsules. 4,987,047, Cl. 430-138.000.

Yun, Chung J., to Crown Cork & Seal Company, Inc. Filling valve for counterpressure filling of cans. 4,986,318, Cl. 141-39.000.

Zabawski, Stanley M.; and Dombroski, Edward L. Enclosed patio table. 4,986,505, Cl. 248-214.000.

Zahn, Rudolf; Schroeder, Hans W.; Borgwardt, Christian; Braig, Albert; Helwig, Gunter; and Dittrich, Kay, to Dornier System GmbH. Antenna support structure. 4,987,425, Cl. 343-853.000.

Zahnradfabrik Friedrichshaften AG: *See*—
Petzold, Rainer; and Wiencek, Norbert, 4,986,401, Cl. 192-0.032.

Zalar, Frank E.: *See*—
Kosmatka, Walter J.; Zalar, Frank E.; and Tener, Dean R., 4,987,343, Cl. 315-82.000.

Zane, Frank. Leg exerciser. 4,986,536, Cl. 272-123.000.

Zarabadi, Seyed R.: *See*—
Kennedy, Richard A.; Zarabadi, Seyed R.; Inman, Stephen L.; and Gravenstein, Martin G., 4,987,387, Cl. 331-1.00A.

Zarnoti, Sandor. Game apparatus. 4,986,547, Cl. 273-241.000.

Zaslavsky, Gregory; and Barakitis, Nikolaos, to GTE Products Corporation. Arc discharge lamp with internal starter. 4,987,344, Cl. 315-59.000.

Zaug, Arthur J.: *See*—
Cech, Thomas R.; Zaug, Arthur J.; and Been, Michael D., 4,987,071, Cl. 435-91.000.

Zdanis, William R., Jr.: *See*—
Miller, Terry L.; Zdanis, William R., Jr.; Woerner, Graham A.; and Horn, Allen F., III, 4,987,274, Cl. 174-102.00R.

Zech, Ludwig V.: *See*—
Brunner, Wolfgang; and Zech, Ludwig V., 4,987,602, Cl. 382-1.000.

Zeigler, John M. Methods for the synthesis of polysilanes. 4,987,202, Cl. 528-10.000.

Zekert, Sheryl L.: *See*—
Carr, Marcus E., Jr.; and Zekert, Sheryl L., 4,986,964, Cl. 422-73.000.

Zerfass, Karl-Christian; Kaulich, Franz; Schops, Michael; Wagner, Hans; and Weiter, Bertrand C., to Hoechst Aktiengesellschaft. Support web for roof foundation webs. 4,987,027, Cl. 428-287.000.

Zeto, Robert J.; Hryckowian, Eugene, deceased (by V., Linda, executor); Morton, David C.; Costello, John A.; and Conrad, John C., to United States of America, Army. Method of smoothing patterned transparent electrode stripes in thin film electroluminescent display panel manufacture. 4,986,876, Cl. 156-643.000.

Zibell, Steven: *See*—
Yatka, Robert; Prombo, Patrick; Barabolak, Roman M.; Zibell, Steven; and McGrew, Gordon N., 4,986,991, Cl. 426-3.000.

Ziliani, Rino; Ziveri, Giuseppe; and Pellinghelli, Ferruccio, to Biffi Italia S.r.l. Sub-sea valve actuator. 4,986,301, Cl. 137-315.000.

Zimmer, Gero, to Productech Inc. Flux effect by microexplosive evaporation. 4,986,463, Cl. 228-205.000.

Zimmerman, Michael: *See*—
Schneider, Alfred; and Zimmerman, Michael, 4,986,028, Cl. 49-248.000.

Zini, Pierangelo: *See*—
Bargiotti, Alberto; Suarato, Antonino; Zini, Pierangelo; Grandi, Maria; and Pezzoni, Gabriella, 4,987,126, Cl. 514-34.000.

Zinn, Bernd; and Lolic, Srboslav, to Grote & Hartmann GmbH & Co. KG. Electrical external connector. 4,986,770, Cl. 439-752.000.

Zip-Pak Incorporated: *See*—
McMahon, Michael J., 4,986,054, Cl. 53-451.000.

Ziveri, Giuseppe: *See*—
Ziliani, Rino; Ziveri, Giuseppe; and Pellinghelli, Ferruccio, 4,986,301, Cl. 137-315.000.

Zojirushi Corporation: *See*—
Takatsuki, Toyohiko; Yoshida, Masahiro; Sugimoto, Konomu; and Sakaguchi, Ryoichi, 4,986,452, Cl. 222-209.000.

Zoltner, John D.; Carter, Daniel L.; Lipani, Anthony F.; and Gardner, John F., to Xerox Corporation. Apparatus for applying hard and soft covers to bound or unbound documents. 4,986,713, Cl. 412-34.000.

Zuffi, Natalio J. Four cycle diesel engine with pressurized air cooling system. 4,986,224, Cl. 123-41.560.

Zumoto, Nobuyuki; Takahama, Toru; Hoshinouchi, Susumu; and Morita, Noriko, to Mitsubishi Denki Kabushiki Kaisha. Thin film forming apparatus. 4,986,214, Cl. 118-722.000.

Zun, Hong-Fu. Caster with lever for braking and direction setting. 4,985,960, Cl. 16-35.00R.

Zwanziger, Peter, to Siemens Aktiengesellschaft. Self-regulating drive circuit for the base current of a power transistor with saturation level control. 4,987,362, Cl. 323-289.000.

2500 Corporation, The: *See*—
Spica, Joseph P., 4,986,209, Cl. 116-28.00R.

501 Alberta Honey Producers Co-operative Limited: *See*—
Sterling, Roy E., 4,986,855, Cl. 127-60.000.

501 Venturdyne, Ltd.: *See*—
Liken, Peter A.; and Ensing, Steven B., 4,986,778, Cl. 439-74.000.

LIST OF REISSUE PATENTEES

TO WHOM

PATENTS WERE ISSUED ON THE 22ND DAY OF JANUARY, 1991

NOTE.—Arranged in accordance with the first significant character or word of the name (in accordance with city and telephone directory practice).

Commercial Insulation Company: *See*—
Devine, Michael J., Re. 33,523, Cl. 137-341.000.

Devine, Michael J., to Commercial Insulation Company. Heated cover for pipeline backflow preventer component assembly. Re. 33,523, Cl. 137-341.000.

Hermach, Carl J.; and Houy, Duane H., to Publishers Equipment Corporation. Conversion of letterpress to offset printing. Re. 33,522, Cl. 101-143.000.

Houy, Duane H.: *See*—
Hermach, Carl J.; and Houy, Duane H., Re. 33,522, Cl. 101-143.000.

Kohashi, Tadao, to Matsushita Electric Industrial Co., Ltd. Transfer recording method and apparatus therefor. Re. 33,525, Cl. 346-76.0PH.

Matsushita Electric Industrial Co., Ltd.: *See*—
Kohashi, Tadao, Re. 33,525, Cl. 346-76.0PH.

National Research Development Corporation: *See*—
Schram, Cornelius J., Re. 33,524, Cl. 210-748.000.

Publishers Equipment Corporation: *See*—
Hermach, Carl J.; and Houy, Duane H., Re. 33,522, Cl. 101-143.000.

Schram, Cornelius J., to National Research Development Corporation. Particle separation. Re. 33,524, Cl. 210-748.000.

LIST OF REEXAMINATION PATENTEES

TO WHOM

CERTIFICATES WERE ISSUED

Kobayashi, Takeshi, to Walbro Far East, Inc. Carburetor. B1 4,271,093, 1-22-91, Cl. 261-34.100.

Walbro Far East, Inc.: *See*—
Kobayashi, Takeshi, B1 4,271,093, Cl. 261-34.100.

LIST OF DESIGN PATENTEES

Abe, Tsutomu; and Watanabe, Kenjiro, to Canon Kabushiki Kaisha. Printing head for ink jet printer. 314,006, 1-22-91; Cl. D18-22.000.

Acer Incorporated: *See*—
Yang, Eric, 313,981, Cl. D14-114.000.

Adachi, Koushiro: *See*—
Ikeda, Minoru; Yamaguti, Miyuki; Umemoto, Syouji; Adachi, Koushiro; Fujimori, Shiro; Ui, Hiroshi; Mori, Toshio; and Tsukaguchi, Tamotsu, 313,980, Cl. D14-109.000.

Adams, Marchelle; and Degenhardt, Mark. Ski support. 313,915, 1-22-91, Cl. D6-552.000.

AI Electronics Corporation: *See*—
Miyakuni, Nobukatsu, 313,978, Cl. D14-106.000.
Miyakuni, Nobukatsu, 313,979, Cl. D14-106.000.

Aktiebolaget Hassle: *See*—
Berglund, Bengt G.; Nilson, Nils B.; and Nilsson, Ake S., 314,051, Cl. D24-53.000.

Aktiebolaget Volvo: *See*—
Gunnarsson, Anders; and Strandang, Lars, 313,963, Cl. D12-155.000.

Alex Synn AG: *See*—
Hopfer, Hans, 313,893, Cl. D6-334.000.

Alger, Andrew L.; and Specht, Paul B. Manicure tool holder and tools. 314,069, 1-22-91, Cl. D28-61.000.

Allen, Dillis V. Golf club head. 314,029, 1-22-91, Cl. D21-214.000.

Ames, Wilbur R., IV: *See*—
Eilert, Randall N.; and Ames, Wilbur R., IV, 313,982, Cl. D14-115.000.

Aobori, Tetsuro: *See*—
Naito, Masahito; Higa, Toshiro; Aobori, Tetsuro; Kubota, Eiichi; and Obata, Takeichi, 313,919, Cl. D7-351.000.

Apotheloz, Christophe: *See*—
Fellmann, Hans-Rudolf; and Apotheloz, Christophe, 313,942, Cl. D10-46.000.

Applegate, Robert L., to Under Sea Industries, Inc. Dive mask. 314,071, 1-22-91, Cl. D29-9.000.

Arai, Takuya, to Fuji Photo Film Co., Ltd. Package for a disposable camera. 313,937, 1-22-91, Cl. D9-432.000.

Arai, Takuya, to Fuji Photo Film Co., Ltd. Package for a disposable camera. 313,938, 1-22-91, Cl. D9-432.000.

Artemide S.p.A.: *See*—
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AT&T Bell Laboratories: *See*—
Bina, Dale C., 313,976, Cl. D14-102.000.

Avia Group International, Inc.: *See*—
Richard, Daniel; Tong, James K.; and Backus, Peter, 313,885, Cl. D2-314.000.

Azpeitia Ortiz de Arri, Juan M., to Solac Telecom, S.A. Telephone set. 313,995, 1-22-91, Cl. D14-151.000.

Backus, Peter: *See*—
Richard, Daniel; Tong, James K.; and Backus, Peter, 313,885, Cl. D2-314.000.

Baisch, Herbert: *See*—
Handler, Milton E.; and Baisch, Herbert, 314,053, Cl. D25-43.000.

Bakic, Karena, to Cosmede Anstalt. Cosmetic case. 314,066, 1-22-91, Cl. D28-77.000.

Ballard, Jacob R., to Vermont American Corporation. Pegboard-attached merchandise display holder. 313,916, 1-22-91, Cl. D6-572.000.

Barker, Steven W.; and McCathren, Richard E., to Summers Group. Product display and dispenser stand. 313,899, 1-22-91, Cl. D6-408.000.

Barrault, Jean-Louis, to Moulinex S.A. Combined electric iron support and steam generator. 314,074, 1-22-91, Cl. D32-73.000.

Beckley, Douglas C. Removable sole for spiked shoes. 313,884, 1-22-91, Cl. D2-277.000.

Beller, Marion M.: *See*—
Beller, Sidney J.; and Beller, Marion M., 314,043, Cl. D23-311.000.

Beller, Sidney J.; and Beller, Marion M. Elastic toilet lid cover. 314,043, 1-22-91, Cl. D23-311.000.

Bende, Antonius F. M., to Publibox Advertising V.O.F. Computer stand with a swivel arm. 313,901, 1-22-91, Cl. D6-429.000.

Benoit-Pequignet, Emile M. F., to Montres Emile Pequignet. Watch. 313,939, 1-22-91, Cl. D10-32.000.

Berg, Lennart, to Polarn Innovation Aktiebolag. Insulating removable cable jacket. 314,042, 1-22-91, Cl. D23-266.000.

Berglund, Bengt G.; Nilson, Nils B.; and Nilsson, Ake S., to Aktiebolaget Hassle. Drug release valve for a parenteral administration system. 314,051, 1-22-91, Cl. D24-53.000.

Bina, Dale C., to AT&T Bell Laboratories. Desktop-computer housing or similar article. 313,976, 1-22-91, Cl. D14-102.000.

Boitani, Maria. Folder for a guided menu, or the like. 314,009, 1-22-91, Cl. D19-26.000.

Bolivar, Domingo F. A., to Oficina de Investigacion Agrupada, S.A. Electric coffee maker. 313,918, 1-22-91, Cl. D7-309.000.

Bonnet, Eric, to ECO Swiss S.p.A. Wrist watch. 313,940, 1-22-91, Cl. D10-32.000.

Bridgestone Corporation: *See*—
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Kobayashi, Toshiaki; and Tomura, Atsushi, 313,959, Cl. D12-145.000.
Brown, Clifton W.; Kriegel, Robert D.; and Olinger, Max R., to Neogen Corporation. Humidity detector. 313,943, 1-22-91, Cl. D10-56.000.
Brunger, Ronald N.; and Vasquez, Ramon R., to Navistar International Transportation Corp. Instrument panel. 313,968, 1-22-91, Cl. D12-192.000.
Caldwell, John P.: *See*—
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Yoshida, Michio, 314,002, Cl. D16-209.000.
Casio Computer Co., Ltd.: *See*—
Ida, Yukihiko, 314,004, Cl. D18-7.000.
Wakamatsu, Masamichi, 313,941, Cl. D10-38.000.
Chan, David Y.: *See*—
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Chang, Herry. Surfing boat. 314,033, 1-22-91, Cl. D21-236.000.
Chen, Kuo-wen. Lighter. 314,062, 1-22-91, Cl. D27-152.000.
Chin, Henry Y.: *See*—
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Clamp Swing Pricing Co., Inc.: *See*—
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Comtech Services, Inc.: *See*—
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Cone, Richard E., to SPE Investments, Inc.; and Midwest Tool and Cutlery Company. Reversable adjustable wrench. 313,925, 1-22-91, Cl. D8-22.000.
Conti, Gerald G. Driving ram adapter block. 313,999, 1-22-91, Cl. D15-21.000.
Cosmede Anstalt: *See*—
Bakic, Karena, 314,066, Cl. D28-77.000.
Crinion, Jonathan H. Chair. 313,897, 1-22-91, Cl. D6-370.000.
Crookes, William E.: *See*—
Haag, Peter C.; Jones, Donald G.; Crookes, William E.; and Felix, Cristian J., 313,962, Cl. D12-155.000.
Haag, Peter C.; Jones, Donald G.; Crookes, William E.; and Felix, Cristian J., 313,967, Cl. D12-192.000.
Culbertson, Richard, to General Electric Company. Control head for a radio. 313,994, 1-22-91, Cl. D14-137.000.
Daiwa Seiko, Inc.: *See*—
Oyama, Mitsuyoshi, 314,036, Cl. D22-142.000.
David Golf Co., Ltd.: *See*—
Iinuma, Kanji, 314,031, Cl. D21-217.000.
Davis, Stephen J., to Prince Manufacturing, Inc. Bumper strip for tennis racquets. 314,028, 1-22-91, Cl. D21-212.000.
Dean, John. Glockenspiel. 314,003, 1-22-91, Cl. D17-23.000.
Decaux, J. C.: *See*—
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DeLuca, Raymond F.; and Seger, Eric S., to Georgia-Pacific Corporation. Air freshener dispenser casing. 314,045, 1-22-91, Cl. D23-366.000.
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CLASS 65

30.13	4,986,841
104	4,986,842
152	4,986,843
229	4,986,844

CLASS 66

9 R	4,986,090
84 R	4,986,091

CLASS 68

12.00 R	4,986,092
13 R	4,986,093
27	4,986,094

CLASS 70

18	4,986,095
54	4,986,096
158	4,986,097
262	4,986,098
277	4,986,099
395	4,986,100

CLASS 71

92	4,986,845
	4,986,846

CLASS 72

10	4,986,101
56	4,986,102
137	4,986,103
158	4,986,104
180	4,986,105
410	4,986,106
457	4,986,107

CLASS 73

1 R	4,986,108
7	4,986,109
23.38	4,986,110
37.5	4,986,111
49.2	4,986,112
	4,986,113
117	4,986,114
118.2	4,986,115
	4,986,116
119 A	4,986,117
146	4,986,118
	4,986,119
155	4,986,120
170 A	4,986,121
204.15	4,986,122
204.26	4,986,123
317	4,986,124
606	4,986,125
708	4,986,126
714	4,986,127
744	4,986,128
756	4,986,129
760	4,986,130
766	4,986,131
852	4,986,132
861.24	4,986,134
861.42	4,986,135
861.58	4,986,133
862.04	4,986,136
862.36	4,986,137
864.34	4,986,138

CLASS 74

5.4	4,986,139
7 C	4,986,140
89.22	4,986,141
473 R	4,986,142
475	4,986,143
606 R	4,986,144
843	4,986,145

CLASS 75

525	4,986,847

CLASS 81

9.4	4,986,148
57.18	4,986,146
63.2	4,986,147

CLASS 82

1.11	4,986,149
137	4,986,150
157	4,986,151

CLASS 83

13	4,986,152
25	4,986,153
54	4,986,154
222	4,986,155
467.1	4,986,156

CLASS 84

327	4,986,158
646	4,986,157
660	4,986,159

CLASS 89

8	4,986,160
	4,986,161
24	4,986,162
196	4,986,163

CLASS 91

461	4,986,164
529	4,986,165

CLASS 92

52	4,986,166
186	4,986,167
194	4,986,168

CLASS 98

2.02	4,986,169
33.1	4,986,170

CLASS 99

279	4,986,171
306	4,986,172
338	4,986,173
345	4,986,174

CLASS 100

163 R	4,986,177
174	4,986,178

CLASS 101

93.04	4,986,179
125	4,986,175
143	Re.33,522
148	4,986,176
348	4,986,181
365	4,986,180
483	4,986,182

CLASS 102

200	4,986,183
256	4,986,184
388	4,986,185
464	4,986,186
493	4,986,188

CLASS 104

12	4,986,189
84	4,986,187

CLASS 105

4.4	4,986,190
168	4,986,191
198.4	4,986,192

CLASS 106

1.11	4,986,848
1.14	4,986,849
25	4,986,850
498	4,986,852
503	4,986,851
504	4,986,853
665	4,986,854

CLASS 108

27	4,986,193
111	4,986,194
150	4,986,195

CLASS 110

235	4,986,196
246	4,986,197
346	4,986,198
347	4,986,199

CLASS 111

135	4,986,200

CLASS 112

456	4,986,201

CLASS 114

39.1	4,986,202
51	4,986,203
61	4,986,204
104	4,986,205
183 R	4,986,206
221 R	4,986,207
270	4,986,208

CLASS 116

28 R	4,986,209

CLASS 118

629	4,986,210
644	4,986,211
715	4,986,212
719	4,986,213
722	4,986,214
728	4,986,215
730	4,986,216

CLASS 119

57.8	4,986,219
57.91	4,986,220
73	4,986,221
168	4,986,217
169	4,986,218

CLASS 122

6 R	4,986,222

CLASS 123

25 B	4,986,223
41.56	4,986,224
52 MF	4,986,225
58 BC	4,986,226
90.16	4,986,227
179 BG	4,986,228
179 G	4,986,229
193 C	4,986,230
193 CP	4,986,234
193 P	4,986,231
195 C	4,986,235
339	4,986,236
352	4,986,237
361	4,986,238
413	4,986,239
452	4,986,240
479	4,986,241
	4,986,242
481	4,986,232
488	4,986,243
	4,986,244
492	4,986,245
520	4,986,246
533	4,986,247
590	4,986,248
634	4,986,233
635	4,986,249

CLASS 124

25.6	4,986,250
67	4,986,251

CLASS 125

21	4,986,252

CLASS 126

21 A	4,986,253
41 R	4,986,254
424	4,986,255

CLASS 127

60	4,986,855

CLASS 128

4	4,986,257
6	4,986,262
7	4,986,258
24 A	4,986,259
24 R	4,986,260
25 R	4,986,261
80 C	4,986,263
	4,986,264
82	4,986,265
94	4,986,266
201.27	4,986,267
204.22	4,986,268
204.23	4,986,269
419 D	4,986,270
635	4,986,271
653 A	4,986,272
653 R	4,986,273
653.4	4,986,256
660.03	4,986,275
660.07	4,986,274
662.04	4,986,276
672	4,986,277
753	4,986,278
754	4,986,279
774	4,986,280
782	4,986,281
857	4,986,282
859	4,986,283

CLASS 131

88	4,986,284
280	4,986,285
290	4,986,286
360	4,986,287

CLASS 132

321	4,986,288
323	4,986,289

CLASS 134

95	4,986,290
122 R	4,986,291
166 R	4,986,292
168 R	4,986,293

CLASS 135

22	4,986,294
66	4,986,295

CLASS 137

3	4,986,296
15	4,986,297
	4,986,298
269	4,986,299
315	4,986,300
	4,986,301
341	Re.33,523
495	4,986,302
559	4,986,303
614.02	4,986,304
625.15	4,986,305
625.17	4,986,306
625.19	4,986,307
625.44	4,986,308
630.14	4,986,309
859	4,986,310

CLASS 138

35	4,986,311
45	4,986,312
89	4,986,313
97	4,986,314

CLASS 139

66 R	4,986,315
452	4,986,316

CLASS 141

1.1	4,986,317
39	4,986,318
98	4,986,319

198 4,986,320
206 4,986,321
319 4,986,322

CLASS 144

253 R 4,986,323

CLASS 148

11.5 C 4,986,856
12 EA 4,986,857

CLASS 149

109.6 4,986,858

CLASS 152

209 R 4,986,324
4,986,325
532 4,986,326
556 4,986,327

CLASS 156

69 4,986,859
78 4,986,860
89 4,986,861
94 4,986,862
194 4,986,863
201 4,986,864
214 4,986,865
220 4,986,866
244.11 4,986,867
249 4,986,868
250 4,986,869
382 4,986,870
494 4,986,871
515 4,986,872
552 4,986,873
577 4,986,874
584 4,986,875
643 4,986,876
4,986,877
4,986,878
649 4,986,879
655 4,986,880

CLASS 157

1.24 4,986,328

CLASS 160

84.1 4,986,329
135 4,986,330
201 4,986,331
327 4,986,332

CLASS 162

56 4,986,881
109 4,986,882
205 4,986,883

CLASS 164

30 4,986,333
312 4,986,334
4,986,335
415 4,986,336
420 4,986,337
457 4,986,338
466 4,986,339
468 4,986,340
477 4,986,341

CLASS 165

40 4,986,342
41 4,986,343
67 4,986,344
86 4,986,345
4,986,346
94 4,986,347
104.24 4,986,348
154 4,986,349

CLASS 166

65.1 4,986,350
85 4,986,351
263 4,986,352
279 4,986,353
4,986,354
295 4,986,355
300 4,986,356
319 4,986,357
321 4,986,358
340 4,986,359
351 4,986,360
381 4,986,361
382 4,986,362

CLASS 169

46 4,986,363
48 4,986,364
60 4,986,365
66 4,986,366

CLASS 172

126 4,986,367
394 4,986,368

CLASS 173

12 4,986,369
31 4,986,370
171 4,986,371

CLASS 174

102 R 4,987,274
106 SC 4,986,372

CLASS 175

21 4,986,373
86 4,986,374
323 4,986,375

CLASS 177

128 4,986,376

CLASS 180

6.48 4,986,378
6.5 4,986,377
79.1 4,986,379
4,986,380
4,986,381
148 4,986,382
165 4,986,383
167 4,986,384
179 4,986,385
209 4,986,386
212 4,986,387
248 4,986,388

CLASS 182

138 4,986,389
234 4,986,390

CLASS 187

1 R 4,986,391

CLASS 188

282 4,986,392
299 4,986,393
364 4,986,394

CLASS 190

1 4,986,395

CLASS 192

0.032 4,986,401
0.052 4,986,396
3.28 4,986,398
3.3 4,986,397
4 A 4,986,399
26 4,986,400
45 4,986,402
70.11 4,986,403
109 F 4,986,404

CLASS 193

38 4,986,405

CLASS 194

350 4,986,406

CLASS 198

367 4,986,407
368 4,986,408
418.4 4,986,409
444 4,986,410
475.1 4,986,411
592 4,986,412
839 4,986,413

CLASS 200

5 A 4,987,275
61.45 M 4,987,276
86 R 4,987,277
294 4,987,278
314 4,987,279

CLASS 203

8 4,986,884
73 4,986,885

CLASS 204

78 4,986,886
129 4,986,887
198 4,986,888
279 4,986,889
298.06 4,986,890
299 R 4,986,891
427 4,986,892

CLASS 206

5.1 4,986,414
45.23 4,986,415
170 4,986,416
214 4,986,417
386 4,986,418
387 4,986,419
459 4,986,421
607 4,986,420

CLASS 208

27 4,986,894
39 4,986,893
4,986,895
52 CT 4,986,896
113 4,986,897
251 R 4,986,898
310 R 4,986,899

CLASS 209

326 4,986,422
397 4,986,900
540 4,986,423
691 4,986,424

CLASS 210

85 4,986,901
86 4,986,902
90 4,986,903
94 4,986,904
104 4,986,905
169 4,986,906
179 4,986,907
198.2 4,986,908
198.3 4,986,909
251 4,986,910
396 4,986,911
448 4,986,912
490 4,986,913
502.1 4,986,914
527 4,986,915
603 4,986,916
634 4,986,917
652 4,986,918
656 4,986,919
710 4,986,920
748 Re.33,524
758 4,986,921

CLASS 211

4 4,986,425
13 4,986,426
64 4,986,427

CLASS 215

11.3 4,986,428
230 4,986,429
253 4,986,430

CLASS 219

10.55 M 4,987,280
50 4,987,281
76.14 4,987,282
85.11 4,987,283
121.43 4,987,284
121.54 4,987,285
121.68 4,987,286
121.69 4,987,287
146.1 4,987,288
209 4,987,289
549 4,987,291

CLASS 220

23.2 4,986,431
23.4 4,986,432
23.8 4,986,433
83 4,986,434
85 H 4,986,435
86 R 4,986,436
90.2 4,986,437
315 4,986,438
334 4,986,439

CLASS 221

45 4,986,440
130 4,986,441
229 4,986,442

CLASS 222

1 4,986,443
23 4,986,444
71 4,986,445
94 4,986,446
129.1 4,986,447
4,986,448
144.5 4,986,449
169 4,986,450
189 4,986,451
209 4,986,452
321 4,986,453
327 4,986,454
368 4,986,455
561 4,986,456

CLASS 223

1 4,986,457

CLASS 224

160 4,986,458
253 4,986,459

CLASS 228

4.5 4,986,460
57 4,986,461
180.1 4,986,462
205 4,986,463

CLASS 229

116 4,986,464
123.3 4,986,465
193 4,986,466

CLASS 232

34 4,986,467

CLASS 236

21 R 4,986,468
49.3 4,986,469
93 R 4,986,470

CLASS 239

3 4,986,471
74 4,986,782
88 4,986,472
104 4,986,473
205 4,986,474
218.5 4,986,475
227 4,986,476
455 4,986,477
585 4,986,478

CLASS 241

15 4,986,479
28 4,986,480
30 4,986,481

CLASS 242

35.6 OR 4,986,482
45 4,986,483
47.01 4,986,484
58.3 4,986,485
74.100 4,986,486
107.5 4,986,487
118.1 4,986,488
151 4,986,489
179 4,986,490
199 4,986,491
294 4,986,492

CLASS 244

2 4,986,493
96 4,986,494
117 A 4,986,495
130 4,986,496
134 C 4,986,497

CLASS 246

458 4,986,498

CLASS 248

27.1 4,986,499
53 4,986,500
122 4,986,501
181 4,986,503
205.3 4,986,504
214 4,986,505
280.1 4,986,506
291 4,986,507
300 4,986,508
396 4,986,509
562 4,986,510

CLASS 250

201.5 4,987,292
206.1 4,987,293
208.1 4,987,294
4,987,295
214 AG 4,987,298
222.1 4,987,296
227.21 4,987,297
231.14 4,987,299
4,987,300
4,987,302
231.16 4,987,301
306 4,987,303
327.2 4,987,304
352 4,987,305
362 4,987,306
368 4,987,307
484.1 4,987,308
492.1 4,987,309
4,987,310
492.2 4,987,311
492.3 4,987,312
506.1 4,987,313
551 4,987,314

CLASS 251

1.3 4,986,511
33 4,986,512
216 4,986,502

CLASS 252

8.8 4,986,922
25 4,986,923
51.5 A 4,986,924
70 4,986,925
102 4,986,926
118 4,986,927
170 4,986,936
171 4,986,928
182.22 4,986,929
182.24 4,986,930
299.63 4,986,931
403 4,986,932
518 4,986,933
586 4,986,934
587 4,986,935

CLASS 256

65 4,986,513

CLASS 261

34.1 B1 4,271,093
81 4,986,937

CLASS 264

1.3 4,986,938
1.7 4,986,939
3.1 4,986,940
13 4,986,941
29.1 4,986,943
40.5 4,986,944
51 4,986,942
60 4,986,945
104 4,986,946
250 4,986,947
257 4,986,948
258 4,986,949
310 4,986,950
516 4,986,951

CLASS 266

49 4,986,515
87 4,986,516
234 4,986,517

CLASS 267

91 4,986,518

CLASS 269

137 4,986,519

CLASS 270

53 4,986,520
54 4,986,521

CLASS 271

2 4,986,522
10 4,986,523
100 4,986,524
114 4,986,525
227 4,986,526
250 4,986,527
265 4,986,528
291 4,986,529
297 4,986,530

CLASS 272

27 N 4,986,531
70 4,986,532
73 4,986,533
96 4,986,534
117 4,986,535
123 4,986,536
132 4,986,537
134 4,986,538

CLASS 273

1 GD 4,986,539
58 H 4,986,540
77 A 4,986,541
118 R 4,986,542
121 A 4,986,543
182 R 4,986,551
183 D 4,986,544
235 R 4,986,545
240 4,986,546
241 4,986,547
346 4,986,548
402 4,986,549
422 4,986,550

CLASS 277

38 4,986,552
152 4,986,553

CLASS 279

1 K 4,986,554

CLASS 280

32.6 4,986,558
47.35 4,986,555
260 4,986,556
298 4,986,557
402 4,986,559
432 4,986,560
605 4,986,561
633 4,986,562
640 4,986,563
642 4,986,564
667 4,986,565
688 4,986,566
690 4,986,567
707 4,986,568
743 4,986,569
808 4,986,570
854 4,986,571

CLASS 281

15.1 4,986,572

CLASS 283

62 4,986,573

CLASS 285

24 4,986,574
325 4,986,575

CLASS 292

40 4,986,576
48 4,986,577
104 4,986,578
201 4,986,579
4,986,580
251.5 4,986,581
336.3 4,986,582
4,986,583
341.16 4,986,584
346 4,986,585

CLASS 294

1.2 4,986,586
1.4 4,986,587
50.7 4,986,588

CLASS 296

37.8 4,986,589
39.2 4,986,590
65.1 4,986,591
97.11 4,987,315
97.8 4,986,592
190 4,986,593
201 4,986,594
4,986,595
203 4,986,596
205 4,986,597
217 4,986,598

CLASS 297

183 4,986,599
238 4,986,600
301 4,986,601
362 4,986,514
4,986,602
468 4,986,603

CLASS 299

39 4,986,604

CLASS 301

105 R 4,986,605
108 R 4,986,606
124 R 4,986,607
4,986,608

CLASS 303

9.69 4,986,609
93 4,986,610
100 4,986,611
110 4,986,612
114 4,986,613
115 4,986,614

CLASS 307

10.1 4,987,316
40 4,987,317
270 4,987,322
351 4,987,323
443 4,987,318
451 4,987,324
465 4,987,319
4,987,325
4,987,326
491 4,987,327
498 4,987,320
520 4,987,321

CLASS 310

68 D 4,987,328
156 4,987,329
217 4,987,330
254 4,987,331
268 4,987,333
309 4,987,332
333 4,987,334

CLASS 312

45 4,986,615
206 4,986,759
208 4,986,616
237 4,986,617
276 4,986,618

CLASS 313

103 R 4,987,335
105 R 4,987,336
406 4,987,337
478 4,987,338
502 4,987,339
512 4,987,340
623 4,987,341

CLASS 315

49 4,987,342
59 4,987,344
82 4,987,343
111.21 4,987,345
111.41 4,987,346
209 R 4,987,347
307 4,987,348
382 4,987,350

CLASS 318

78 4,987,351
254 4,987,352
293 4,987,349
4,987,353
444 4,987,354
561 4,987,355
578 4,987,356
587 4,987,357
603 4,987,358

625 4,987,359

CLASS 320

6 4,987,360

CLASS 323

222 4,987,361
289 4,987,362

CLASS 324

142 4,987,363
158 F 4,987,365
158 P 4,987,364
207.26 4,987,366
227 4,987,367
303 4,987,368
307 4,987,369
318 4,987,370
320 4,987,371
705 4,987,372

CLASS 328

155 4,987,373

CLASS 329

302 4,987,374
309 4,987,375

CLASS 330

4.3 4,987,376
54 4,987,377
149 4,987,378
253 4,987,379
254 4,987,380
255 4,987,381
277 4,987,382
279 4,987,383
286 4,987,384
297 4,987,385

CLASS 331

1 A 4,987,387
10 4,987,386
158 4,987,388
167 4,987,389

CLASS 332

173 4,987,390

CLASS 333

12 4,987,391
103 4,987,392
202 4,987,393
237 4,987,394

CLASS 335

17 4,987,395
126 4,987,396
131 4,987,397
299 4,987,398

CLASS 336

192 4,987,399

CLASS 338

164 4,987,400

CLASS 340

332 4,987,401
426 4,987,402
457 4,987,403
461 4,987,404
479 4,987,405
539 4,987,406
540 4,987,407
604 4,987,408
623 4,987,409
705 4,987,410
709 4,987,411
721 4,987,412
970 4,987,413

CLASS 341

15 4,987,414
4,987,415
118 4,987,416
159 4,987,417

CLASS 342

6 4,987,418
75 4,987,419
457 4,987,420

CLASS 343

700 MS 4,987,421
713 4,987,422
741 4,987,423
795 4,987,424
853 4,987,425

CLASS 346

76 PH Re.33,525
108 4,987,426
157 4,987,428
4,987,429

CLASS 350

3.61 4,986,619
96.15 4,986,620
4,986,622
4,986,623
96.19 4,986,624
96.2 4,986,621
96.20 4,986,625
4,986,626
96.21 4,986,627
96.29 4,986,628
96.33 4,986,629
96.34 4,986,630
112 4,986,631
131 4,986,632
167 4,986,633
174 4,986,634
311 4,986,635
319 4,986,636
339 F 4,986,637
341 4,986,638
354 4,986,639
358 4,986,640
432 4,986,641
4,986,642
477 4,986,643
548 4,986,644
560 4,986,645
637 4,986,646

CLASS 351

51 4,986,647
130 4,986,649
156 4,986,650
160 R 4,986,648

CLASS 353

66 4,986,651

CLASS 354

21 4,987,431
77 4,987,432
106 4,987,434
132 4,987,433
195.11 4,987,435
203 4,987,436
275 4,987,437
319 4,987,438

CLASS 355

40 4,987,439
41 4,987,440
50 4,987,441
4,987,442
69 4,987,444
84 4,987,445
85 4,987,443
200 4,987,446
204 4,987,447
205 4,987,448
206 4,987,449
228 4,987,450
245 4,987,451
4,987,452
246 4,987,453
259 4,987,454
271 4,987,455
273 4,987,456
285 4,987,457

CLASS 356

2 4,986,652
5 4,986,653
43 4,986,654
73 4,986,655
4,986,656
4,986,657
318 4,986,658
336 4,986,659
342 4,986,660
350 4,986,661
375 4,986,662
4,986,663
376 4,986,664
402 4,986,665

CLASS 357

4 4,987,458
8 4,987,430
14 4,987,459
17 4,987,460
19 4,987,461
22 4,987,462
23.13 4,987,465
23.800 4,987,464
24 4,987,466
27 4,987,467
34 4,987,468
35 4,987,469
49 4,987,471
60 4,987,472
67 4,987,562
70 4,987,473
4,987,474
4,987,475
74 4,987,476
75 4,987,477
81 4,987,478
022 4,987,463
049 4,987,470

CLASS 358

3 4,987,479
13 4,987,480
36 4,987,481
41 4,987,482
64 4,987,483
75 4,987,484
80 4,987,485
86 4,987,486
92 4,987,487
93 4,987,488
105 4,987,489
136 4,987,490
166 4,987,491
181 4,987,492
183 4,987,493
213.11 4,987,494
448 4,987,495
4,987,496
452 4,987,497
456 4,987,498
474 4,987,499

CLASS 360

46 4,987,500
64 4,987,501
75 4,987,502
90 4,987,503
95 4,987,504
103 4,987,505
105 4,987,506
106 4,987,507
113 4,987,508
4,987,509
126 4,987,510

CLASS 361

35 4,987,511
57 4,987,512
92 4,987,513
220 4,987,514
321 4,987,515
413 4,987,516
417 4,987,517
517 4,987,518
518 4,987,519
521 4,987,520

CLASS 362

61 4,987,521
74 4,987,522
188 4,987,523
355 4,987,524

CLASS 363

21 4,987,525

CLASS 364

167.01 4,987,526
4,987,527
184 4,987,528
200 4,987,529
4,987,530
4,987,531
4,987,532
4,987,533
4,987,534
4,987,535
4,987,536
4,987,537
401 4,987,538
413.08 4,987,539
424.02 4,987,540
424.04 4,987,541
424.05 4,987,542
426.03 4,987,543
431.05 4,987,544
468 4,987,545
474.3 4,987,546
478 4,987,547
498 4,987,548
510 4,987,549
521 4,987,550
4,987,551
4,987,552
4,987,553
522 4,987,554
561 4,987,555
580 4,987,556
750.5 4,987,557

CLASS 365

183 4,987,558
189.04 4,987,559
200 4,987,560
230.08 4,986,666

CLASS 366

173 4,986,667

CLASS 367

53 4,987,561
88 4,987,563
140 4,987,564

CLASS 369

44.15 4,987,565
59 4,986,668
122 4,987,566

CLASS 370

3 4,987,567
15 4,987,568
32.1 4,987,569
84 4,987,570
85 4,987,571
91 4,987,572
111 4,987,573

CLASS 372

28 4,987,574
41 4,987,575
46 4,987,576
82 4,987,577

CLASS 374

107 4,986,669
117 4,986,670
131 4,986,671
4,986,672

CLASS 375

121 4,987,578

CLASS 376

215 4,986,952
245 4,986,953
254 4,986,954
261 4,986,955
283 4,986,956
417 4,986,957
419 4,986,958
445 4,986,959
446 4,986,960

CLASS 377

25 4,987,579
60 4,987,580

CLASS 378

19 4,987,581
85 4,987,582
91 4,987,583
100 4,987,584
197 4,987,585

CLASS 379

10.3 4,987,589
93 4,987,586
94 4,987,587
98 4,987,588
204 4,987,590
279 4,987,591
430 4,987,592

CLASS 380

3 4,987,593
6 4,987,594
50 4,987,595

CLASS 381

41 4,987,596
69 4,987,597
71 4,987,598
107 4,987,599
118 4,987,600
159 4,987,601

CLASS 382

1 4,987,602
8 4,987,604
25 4,987,603

CLASS 383

61 4,986,673

CLASS 384

10 4,986,674
192 4,986,675

CLASS 392

375 4,987,290

CLASS 400

124 4,986,676
187 4,986,677
208 4,986,678
4,986,679

CLASS 401

1 4,986,680
7 4,986,681
4,986,682
195 4,986,683
213 4,986,685
224 4,986,684
4,986,686

CLASS 403

2 4,986,687
127 4,986,688
4,986,689
319 4,986,690
375 4,986,691

CLASS 404

1 4,986,692
4 4,986,693
6 4,986,694
118 4,986,695

CLASS 405

36 4,986,696
50 4,986,699
165 4,986,697
169 4,986,698
186 4,986,700

CLASS 408

1 R 4,986,701
54 4,986,702

CLASS 409

131 4,986,703
233 4,986,704

CLASS 410

57 4,986,705
129 4,986,706
132 4,986,707

CLASS 411

20 4,986,708
30 4,986,709
38 4,986,710
55 4,986,711
428 4,986,712

CLASS 412

34 4,986,713

CLASS 414

256 4,986,714
331 4,986,715
409 4,986,716
417 4,986,717
421 4,986,718
478 4,986,719
563 4,986,720
685 4,986,721
723 4,986,722
729 4,986,723
4,986,724
751 4,986,725
787 4,986,729
789.1 4,986,726
792.7 4,986,730
798.9 4,986,731

CLASS 415

066 4,986,732
230 4,986,733

CLASS 416

48 4,986,734
134 A 4,986,735
181 4,986,736
190 4,986,737

CLASS 417

57 4,986,727
304 4,986,738
443 4,986,728

CLASS 418

15 4,986,739
83 4,986,740
268 4,986,741

CLASS 419

36 4,986,961

CLASS 422

7 4,986,962
30 4,986,963
73 4,986,964
102 4,986,965
168 4,986,966
186.19 4,986,968
188 4,986,967

CLASS 423

82 4,986,742
115 4,986,969
321 R 4,986,970
342 4,986,971
344 4,986,972
479 4,986,973
488 4,986,974
4,986,975
551 4,986,976
592 4,986,977
648.1 4,986,978

CLASS 424

1.1 4,986,979
9 4,986,980
50 4,986,981
63 4,986,982
85.5 4,986,984
070 4,986,983
195.1 4,986,985
4,986,986
473 4,986,987
520 4,986,988
635 4,986,989
665 4,986,990

CLASS 425

7 4,986,743
94 4,986,744
182 4,986,745
224 4,986,746
519 4,986,747

CLASS 426

3 4,986,991
19 4,986,992
93 4,986,993
330.3 4,986,994
412 4,986,995
545 4,986,996
622 4,986,997
647 4,986,998
656 4,986,999

CLASS 427

11 4,987,000
28 4,987,001
34 4,987,002
37 4,987,003
38 4,987,004
39 4,987,005
53.1 4,987,006
4,987,007
4,987,008
96 4,987,009
103 4,987,010
215 4,987,011
221 4,987,012
233 4,987,013
278 4,987,014
389.9 4,987,015

CLASS 428

34.1 4,987,016
36.8 4,987,017
36.9 4,987,018
42 4,987,019
64 4,987,020
4,987,021
182 4,987,022
215 4,987,023
219 4,987,024
220 4,987,025
246 4,987,026
287 4,987,027
312.6 4,987,028
319.3 4,987,029
373 4,987,030
402.2 4,987,031
411.1 4,987,032
469 4,987,033
593 4,987,034
599 4,987,035
626 4,987,036
653 4,987,037
672 4,987,038
694 4,987,039
4,987,040

CLASS 429

59 4,987,041
213 4,987,042

CLASS 430

7 4,987,043
20 4,987,044
59 4,987,045
127 4,987,046
138 4,987,047
166 4,987,048
203 4,987,049
252 4,987,050
253 4,987,051
264 4,987,052
275 4,987,054
277 4,987,053
4,987,055
281 4,987,056
4,987,057
372 4,987,058
428 4,987,059
434 4,987,060
531 4,987,061
546 4,987,062
550 4,987,063
570 4,987,064

CLASS 431

188 4,986,748

CLASS 432

28 4,986,749
131 4,986,750

CLASS 433

6 4,986,751
138 4,986,752
172 4,986,753
224 4,986,754

CLASSIFICATION OF PATENTS

CLASS 434

96 4,986,756
008 4,986,755
127 4,986,757

CLASS 435

5 4,987,065
6 4,987,066
22 4,987,067
41 4,987,068
69.1 4,987,069
69.7 4,987,070
91 4,987,071
119 4,987,072
172.3 4,987,073
4,987,074
182 4,987,075
191 4,987,076
223 4,987,077
231 4,987,078
240.2 4,987,079
240.25 4,987,080
262 4,987,081
289 4,987,082

CLASS 436

55 4,987,083
63 4,987,084
169 4,987,085
501 4,987,086

CLASS 437

6 4,987,087
34 4,987,088
4,987,089
52 4,987,090
4,987,091
57 4,987,092
69 4,987,093
81 4,987,094
106 4,987,095
129 4,987,096
4,987,097
142 4,987,098
192 4,987,099
206 4,987,100
228 4,987,101
238 4,987,102

CLASS 439

71 4,986,760
74 4,986,778
99 4,986,761
108 4,986,779
131 4,986,762
165 4,986,763
275 4,986,764
326 4,986,765
352 4,986,766
595 4,986,758
621 4,986,767
680 4,986,768
681 4,986,769
752 4,986,770
790 4,986,771
892 4,986,772

CLASS 440

61 4,986,773
75 4,986,774
83 4,986,775
87 4,986,776
88 4,986,777
89 4,986,780
900 4,986,783

CLASS 441

65 4,986,784
084 4,986,785
120 4,986,786
130 4,986,781

CLASS 445

24 4,986,787
50 4,986,788

CLASS 446

93 4,986,789
253 4,986,790
361 4,986,791
408 4,986,792

CLASS 452

135 4,985,964
187 4,985,963

CLASS 455

161 4,987,605
188 4,987,606
618 4,987,607

CLASS 460

47 4,986,793
67 4,986,794

CLASS 474

91 4,986,795
101 4,986,796
4,986,797
214 4,986,798
240 4,986,799

CLASS 475

113 4,986,800
331 4,986,801
346 4,986,802

CLASS 493

24 4,986,803
193 4,986,804
199 4,986,805
468 4,986,806

CLASS 501

89 4,987,103
92 4,987,104
96 4,987,105
137 4,987,107
138 4,987,108
147 4,987,106

CLASS 502

66 4,987,109
68 4,987,110
113 4,987,111
255 4,987,112
338 4,987,113
341 4,987,114
419 4,987,115
427 4,987,116

CLASS 503

200 4,987,117
4,987,118
227 4,987,119
4,987,120

CLASS 514

8 4,987,121
15 4,987,122
19 4,987,123
23 4,987,124
33 4,987,125
34 4,987,126
159 4,987,127
175 4,987,128
206 4,987,129
210 4,987,130
220 4,987,131
252 4,987,132
4,987,133
4,987,134
274 4,987,135
282 4,987,136
294 4,987,137
320 4,987,138
321 4,987,139
335 4,987,140
346 4,987,141
383 4,987,142
4,987,143
4,987,144
394 4,987,145
397 4,987,146
399 4,987,147
441 4,987,148
450 4,987,149
455 4,987,150
548 4,987,151
603 4,987,152
620 4,987,153
772 4,987,154

CLASS 521

50 4,987,157
77 4,987,155
99 4,987,156

CLASS 522

31 4,987,158
36 4,987,159
164 4,987,160

CLASS 523

102 4,987,161
212 4,987,162
414 4,987,163
435 4,987,165

CLASS 524

68 4,987,166
95 4,987,167
104 4,987,168
267 4,987,169
4,987,170
396 4,987,171
413 4,987,164
416 4,987,172
423 4,987,173
444 4,987,174
449 4,987,175
456 4,987,176
517 4,987,177
547 4,987,178
762 4,987,179
860 4,987,180

CLASS 525

54.1 4,987,181
57 4,987,182
59 4,987,183
63 4,987,184
66 4,987,185
107 4,987,186
173 4,987,187
180 4,987,188
183 4,987,189
193 4,987,190
227 4,987,191
274 4,987,192
313 4,987,193
314 4,987,194
327.3 4,987,195
329.4 4,987,196
346 4,987,197
436 4,987,198
491

CLASS 526

75 4,987,200
243 4,987,209
251 4,987,211
258 4,987,210
348.4 4,987,212

CLASS 527

301 4,987,213

CLASS 528

4 4,987,201
10 4,987,202
27 4,987,203
59 4,987,204
104 4,987,205
125 4,987,206
170 4,987,207
272 4,987,208
317 4,987,214
329.1 4,987,215
4,987,216
340 4,987,217
353 4,987,218
4,987,219
491 4,987,220

CLASS 534

561 4,987,221

CLASS 536

17.7 4,987,223
21 4,987,222
23 4,987,224
124 4,987,225

CLASS 540

145 4,987,226
452 4,987,227

CLASS 544

198 4,987,228
243 4,987,229

CLASS 546

94 4,987,230
135 4,987,231
153 4,987,232

CLASS 548

140 4,987,233
305 4,987,234
430 4,987,235

CLASS 549

208 4,987,236
222 4,987,237
241 4,987,238
250 4,987,239
436 4,987,240

CLASS 556

23 4,987,242
27 4,987,243
89 4,987,244
104 4,987,245
137 4,987,246
174 4,987,241

CLASS 560

23 4,987,247
157 4,987,248

CLASS 562

102 4,987,249
118 4,987,250
506 4,987,251
600 4,987,252
623 4,987,253
851 4,987,254

CLASS 564

119 4,987,255
126 4,987,256
153 4,987,257
309 4,987,258
335 4,987,259
402 4,987,260
428 4,987,261
443 4,987,262
491 4,987,263

CLASS 568

33 4,987,264
435 4,987,265
584 4,987,266
615 4,987,267
616 4,987,268
621 4,987,271
640 4,987,272
720 4,987,269
758 4,987,273
905.000 4,987,270

CLASS 604

22 4,986,807
4,986,808
4,986,825
26 4,986,809
106 4,986,810
110 4,986,811
4,986,812
4,986,813
164 4,986,814
180 4,986,815
192 4,986,816
4,986,817
4,986,818
198 4,986,819
218 4,986,820
251 4,986,821
276 4,986,822
329 4,986,823
333 4,986,824

CLASS 606

82 4,986,826
107 4,986,827
152 4,986,828
188 4,986,829
194 4,986,830

CLASS 623

1 4,986,831
4,986,832
19 4,986,833
23 4,986,834

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D2— 162 313,965
226 313,883
277 313,884
314 313,885
D3— 38 313,886
45 313,887
77 313,888
105 313,889
D4— 102 313,890
D6— 324 313,891
333 313,892
334 313,893
336 313,894
355 313,895
365 313,896
370 313,897
405 313,898
408 313,899
410 313,900
429 313,901
446 313,902
449 313,903
457 313,904
462 313,905
467 313,906
480 313,907
313,908
486 313,909
313,910
491 313,911
500 313,912
522 313,913
541 313,914
552 313,915
572 313,916
601 313,917
D7— 309 313,918
351 313,919
398 313,920
509 313,921
545 313,922
693 313,923
D8— 1 313,924
22 313,925
301 313,926
360 313,932
373 313,933
375 313,927
313,928
395 313,929
313,934
D9— 350 313,930
351 313,931
375 313,935
418 313,936
432 313,937
313,938
D10— 32 313,939
313,940
38 313,941
46 313,942
56 313,943
64 313,944
313,945
72 313,946
75 313,947
83 313,948
101 313,949
109 313,950
119 313,951
D11— 127 313,952
221 313,953
D12— 96 313,954
102 313,955
106 313,956
115 313,957
136 313,958
145 313,959
146 313,960
151 313,961
155 313,962
313,963
156 313,964
181 313,966
192 313,967
313,968
D13— 133 313,969
147 313,970
160 313,971
164 313,972
168 313,973
173 313,974
D14— 100 313,975
102 313,976
106 313,977
313,978
313,979
109 313,980
114 313,981
115 313,982
118 313,983
313,984
313,985
313,986
313,987
313,988
313,989
313,990
313,991
313,992
137 313,993
313,994
151 313,995
165 313,996
218 313,997
257 313,998
D15— 21 313,999
83 314,000
D16— 102 314,001
209 314,002
D17— 23 314,003
D18— 7 314,004
12 314,005
22 314,006
314,007
36 314,008
D19— 26 314,009
314,010
27 314,011
65 314,012
76 314,013
D20— 10 314,014
27 314,015
43 314,016
314,017
D21— 41 314,018
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134 314,020
145 314,021
148 314,022
171 314,023
191 314,024
314,025
314,026
195 314,027
212 314,028
214 314,029
217 314,030
314,031
233 314,032
236 314,033
252 314,034
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D22— 142 314,036
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D23— 228 314,038
231 314,039
238 314,040
241 314,041
266 314,042
311 314,043
366 314,044
314,045
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378 314,047
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D24— 1.1 314,049
53 314,050
314,051
D25— 33 314,052
43 314,053
126 314,054
D26— 27 314,055
38 314,056
49 314,057
63 314,058
73 314,059
90 314,060
D27— 134 314,061
152 314,062
154 314,063
D28— 17 314,065
35 314,064
38 314,067
54.1 314,070
58 314,068
61 314,069
77 314,066
D29— 9 314,071
D32— 22 314,072
70 314,073
73 314,074
D34— 13 314,075
D99— 28 314,076

CLASSIFICATION OF PLANTS

P.— 7 7,424
68 7,425
7,426
7,427
7,428
89 7,429

GEOGRAPHICAL INDEX

OF RESIDENCE OF INVENTORS

(U.S. States, Territories and Armed Forces, the Commonwealth of Puerto Rico, and the Canal Zone)

Alabama	1	Kentucky	21	Oregon	41
Alaska	2	Louisiana	22	Pennsylvania	42
American Samoa	3	Maine	23	Puerto Rico	43
Arizona	4	Maryland	24	Rhode Island	44
Arkansas	5	Massachusetts	25	South Carolina	45
California	6	Michigan	26	South Dakota	46
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(First number in listing denotes location according to above key. Refer to patent number in body of the Official Gazette to obtain details as to inventor name, location, etc.)

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